ISASC

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QUARTERLY MAGAZINE OF THE INTERNATIONAL SOCIETY OF ANTIQUE SCALE COLLECTORS

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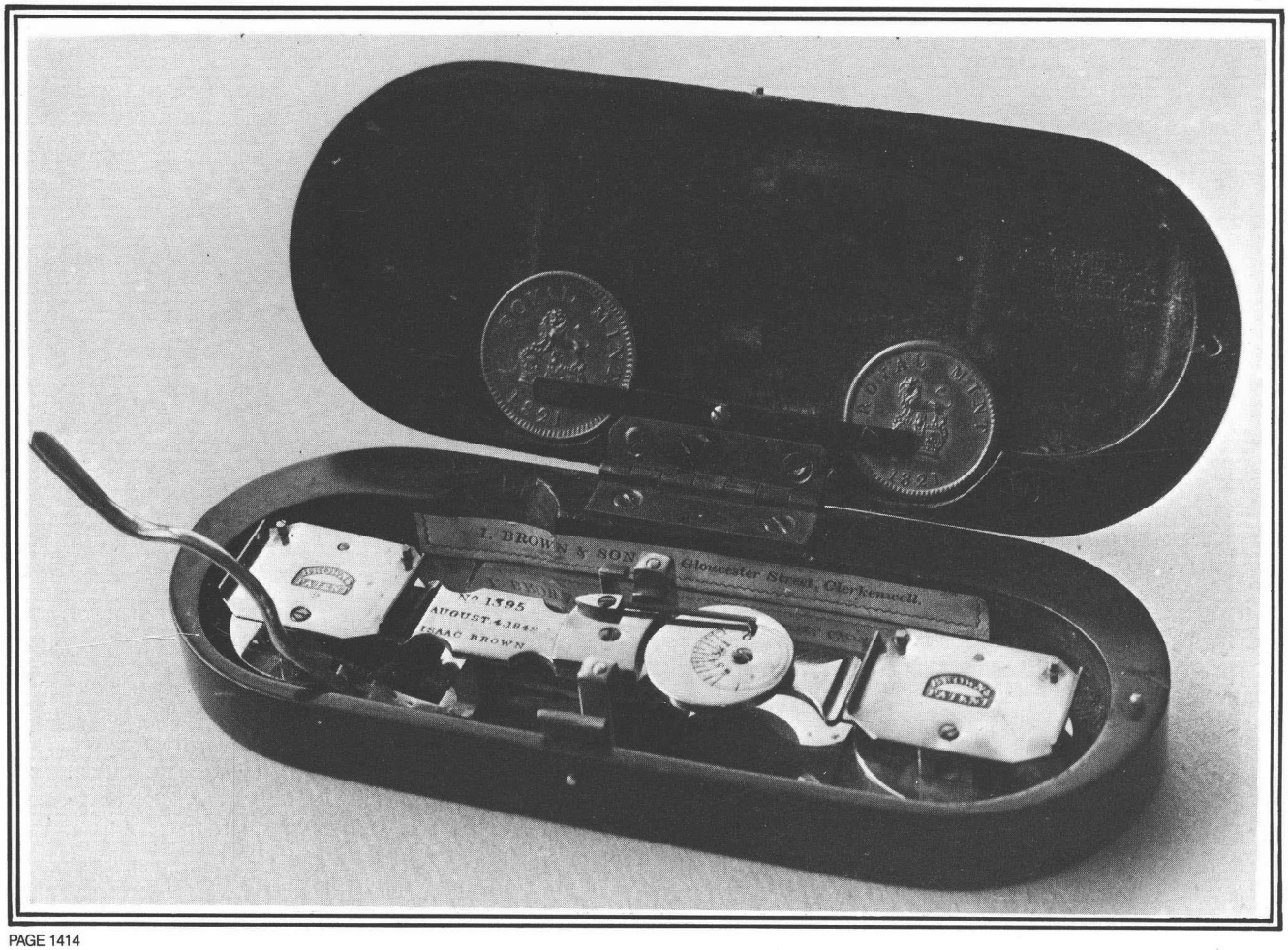

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Cover Picture

Michael's Favorites

ISAAC BROWN'S SCALES.

BY MICHAEL CRAWFORTH

Isaac Brown of Clerkenwell was listed in London Trade Directories from 1828 until 1846, his son being with him in the trade from 1839 until 1846. He was listed variously as a watch-maker, a tool dealer and watch-maker, a watch and clock-maker and supplier of watch etc. makers' materials, a manufacturer of bezel winding watch and alarum parts and as a watch-tool dealer. In 1829 he obtained Patent no. 5851 for watches, the significance of which will become apparent later. This indication of inventive talent was confirmed in 1842, when Brown took out a Design Registration for a balance for weighing sovereigns and half-sovereigns, (Cover picture.) The original art-work for the registration, still held at the Public Records Office at Kew, was delicately painted in water-colours to represent the attractive appearance and the materials used. Even this nice painting could not do justice to the superb quality, fine finish and the sheer seductiveness of the real balance.

The first impression is of a silky-smooth, rich dark rosewood box with elegantly rounded ends, and domed to fit the curve of a caressing hand. Two tiny brass knobs facilitate opening the lid, and inside, the unusual shapes of the brass balance, and the precise craftsmanship obvious in every detail, rivet the attention of the avid collector. The flat equal-arm brass beam is gracefully scalloped between rectangular areas. On the left it is stamped 'No. 1395, August 4 1842, Isaac Brown,' this being the designated Design Registration number and the date on which it was allocated to Isaac Brown. At each end of the beam there is a flat brass pan, rectangular in form, with the corners mitred at 45 degrees and the sides turned up to retain the coin on the right hand side or the weight on the

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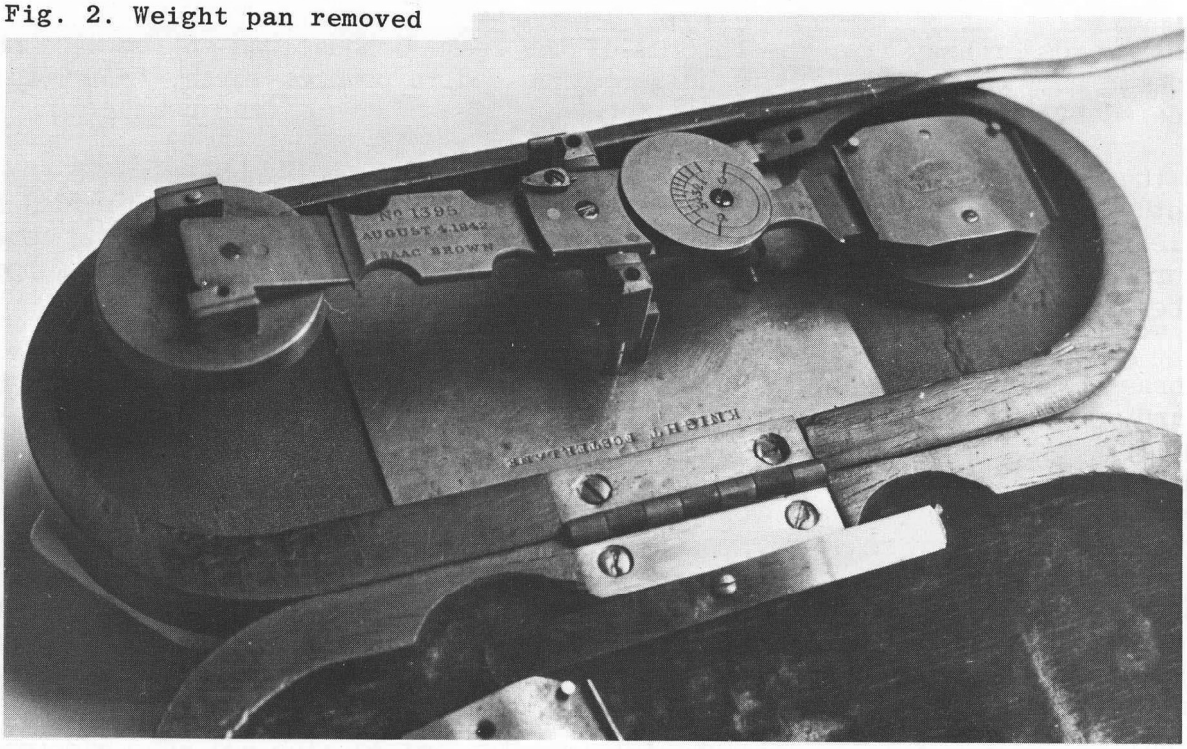
Fig. 2. Weight pan removed



left hand side. Towards the rear of each plate there are two small projecting pins to locate the load precisely. Stamped in the centre is 'Brown's Patent' in a domed rectangle. These plates or pans are conveniently placed above the beam, stabilised in a horizontal position by flat circular masses suspended below, (see the left hand side of Fig. 2.) The resulting construction is extremely low and compact.

Attached to the beam, to the right of the fulcrum, is a flat disc-shaped weight which can be rotated around the fixing pin or axle. This axle is not in the centre of the disc, so that, when the disc is rotated, the centre of the mass of the disc

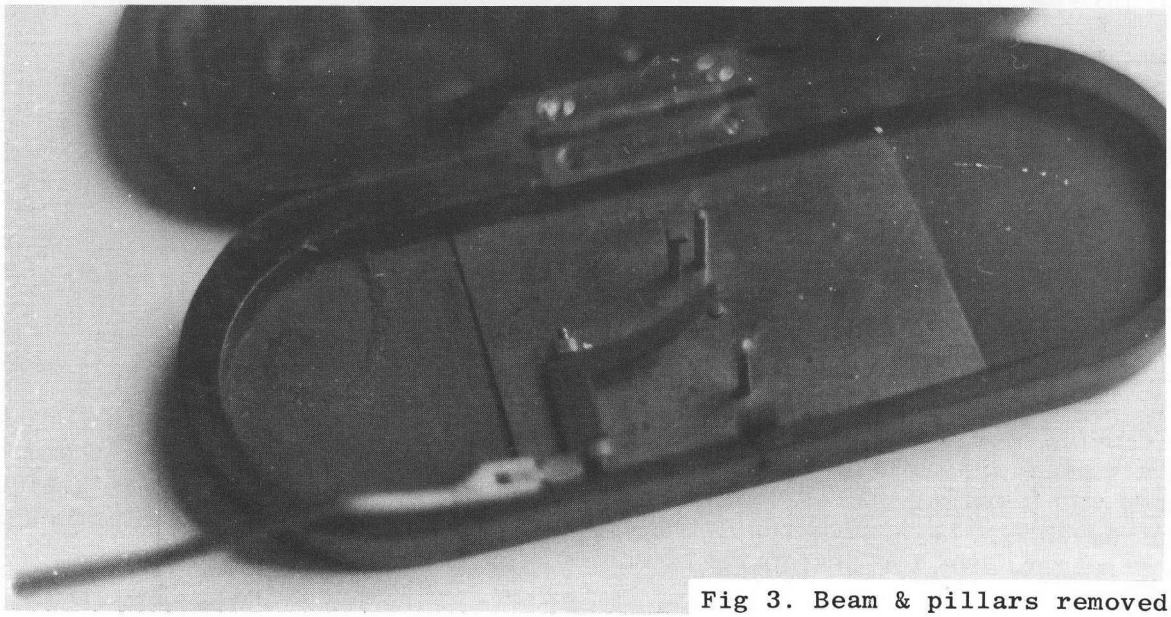


Fig 3. Beam & pillars removed

moves towards or away from the fulcrum of the beam. Graduations on the disc show the deficiency of weight in worn coins, expressed in pennies-worth, from 0 to 6, indicated by a blued steel pointer attached to the centre of the beam.

When the box is opened, the beam is in the immobilised position. To raise it slightly, into the weighing position, a slender serpentine lever is unfolded to the left of the box and depressed, (see the extreme left hand side of the Cover picture.) The inner end of the lever raises the short twin columns which support the beam, by sliding them up two polished steel rods, (see Fig. 3.)

The brass base plate, shown in Fig. 3, had two pins attached to it, up which the pillars moved, and also the serpentine lever which pushed the pillars up the pins. It was stamped 'KNIGHT, FOSTER LANE,' George Knight was an ironmonger and supplier of Chemical and Philosophical apparatus, who had an interest in scales. Only three days before Isaac Brown took out his design registration, George Knight took out design registration number 1385 for a 'Standard for Scales,' which was illustrated with a conventional two pan, equal arm beam of the type used for bank scales, on a pillar incorporating a concealed lever lift. Was the concealed mechanism the same as that used by Brown?. Was that why Knight's name was stamped on the base? If it was, why was the protective design registration not mentioned?

Inside the lid, two scalloped recesses locate the weights, which are held in place by a blued steel clip. the weights are embossed, on the obverse with a lion over the Imperial crown and ROYAL MINT 1821, and on the reverse with , on the larger weight, CUR^{t} WEIGHT SOVEREIGN 5.2½ and , on the smaller weight, CUR^{t} WEIGHT HALF SOVEREIGN 2.13½.

Pasted on the inside rear edge of the box is a narrow paper label, bearing the name 'I BROWN & SON 32 Gloucester Street, Clerkenwell', cut from the bottom of a larger label.

Earlier in his career, he had a trade label of the kind that was frequently cut up to provide brief labels. It said;

ISAAC BROWN

27, GLOUCESTER ST, CLERKENWELL, LONDON

Patentee and Manufacturer of the Bezel Winding Clock and Alarum Watches

An Assortment of Clocks and Watchmakers' Tools and other Materials,

Jewellery made and repaired.

The deceptive way in which a patent for watch parts is referred to on the pans, and a number and date on the beam, actually for registration, infers that the number was a patent number for the balance. This was intended to give a signif-icant advantage because patent protection was valid for longer, and patent law was stronger than for design registration.

Fig. 4. 2nd Brown design

The weights bear the date of the original introduction of that design, in 1821, but the stamp was used by the Mint until a new design was produced in 1842. It can be inferred, from this, that the balance was made in 1842, or very soon afterwards, if old stocks of weights were being used up by Brown.

Only three of these balances are known to the author, one in the collection of the Welcome Medical Museum, (since transferred to the Science Museum in London.) The other two belong to members of the society, ISASC.

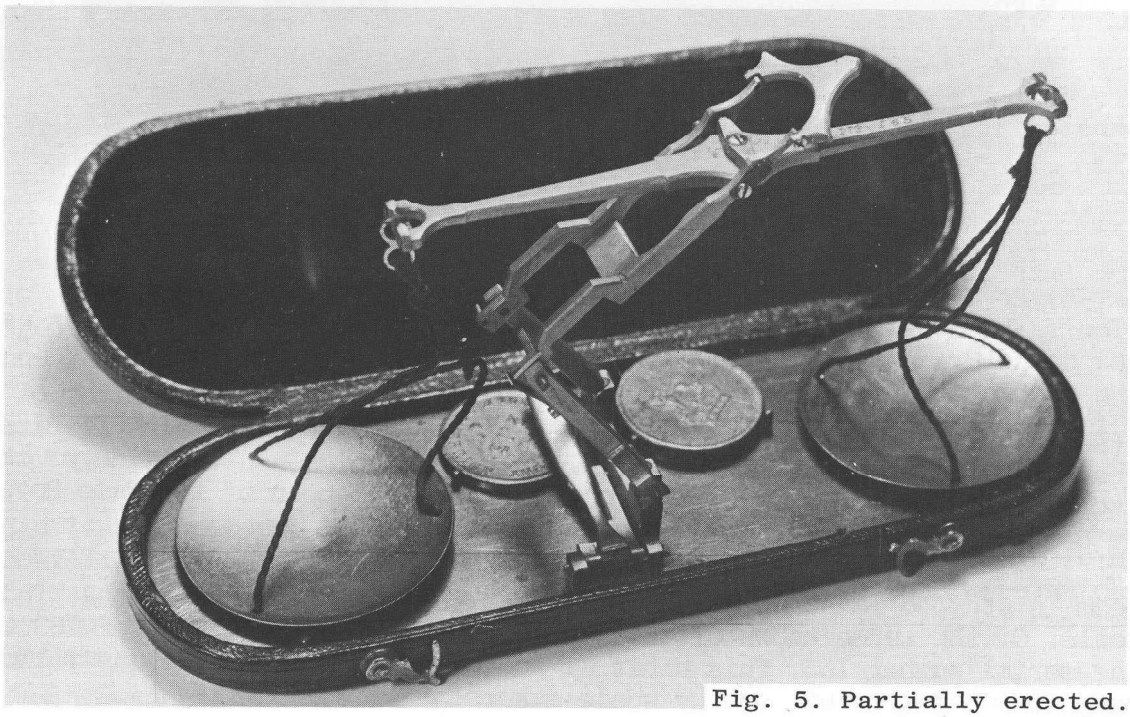


Fig. 5. Partially erected.

Innovation is equally evident in another of Isaac Brown's balances shown in Fig. 4. It is in a flat maroon leather-covered box, with rounded ends. The slightly soft morocco leather has a luxurious feel appropriate to the unusual contents. Inside, the observer is intrigued by the juxtaposition of strangely shaped pieces of gilded brass. Near the top lies the slender equal-armed beam, and above it is a small 'handle' shaped rather like the roof of a pagoda. At each side of the beam is an elegantly shaped and folded bar, and beneath the beam are two brass pans.

When the 'handle' is lifted, the two bars unfold and rise to form twin support columns for the beam, (see Fig. 5.) The 'handle' is a bridge joining the tops of the columns. At the base of the columns, a slender curved lever is used to raise the beam from the arrested position to the weighing position, by sliding the columns up two polished steel rods. The pans are suspended by green silk cords from 8 links bearing on knife-edges set in the forked ends of the beam, a unique design used only by Isaac Brown.

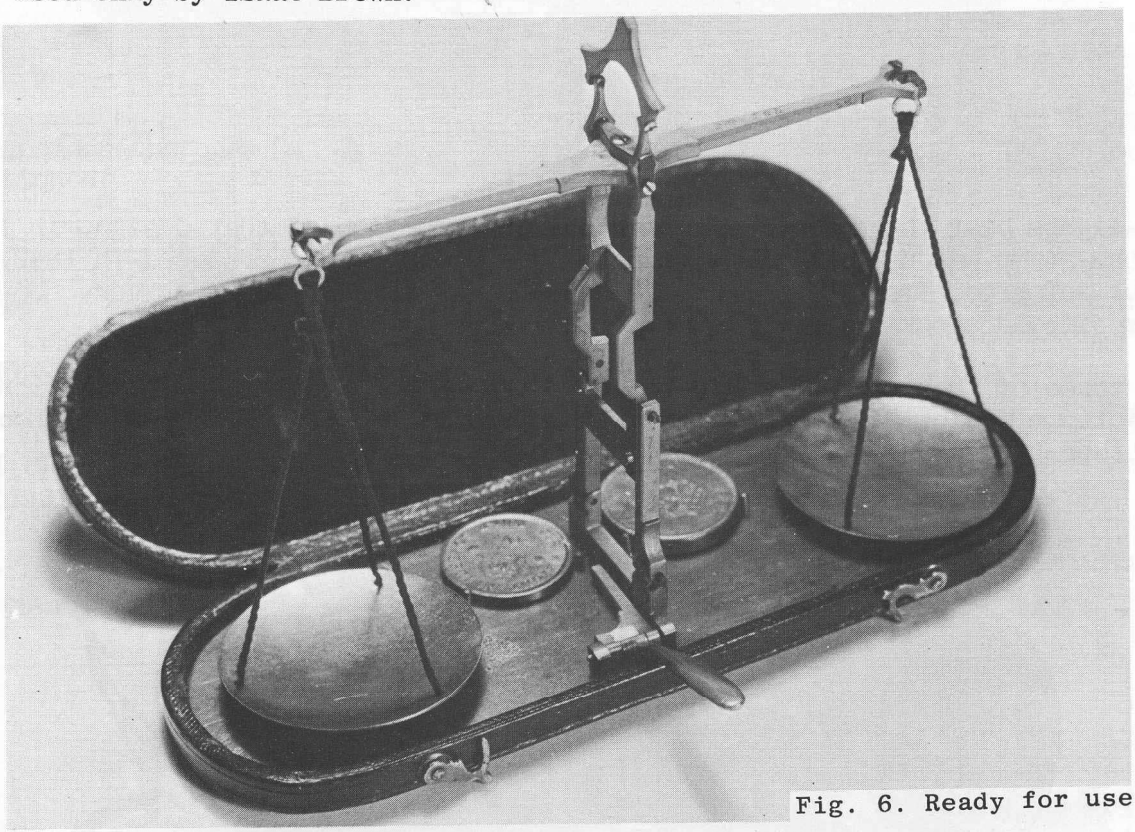


Fig. 6. Ready for use

The columns are attached to a flat brass base-plate fixed to the bottom of the box, (see Fig. 7.) Towards the rear of the base-plate are two pairs of pins, one pair each side of the centre. Located between these pins and the side of the box are two weights for the sovereign and half sovereign, both of the same Royal Mint design described above.

The beam is stamped ISAAC BROWN. LONDON. with the serial number of that individual scale. Of the three known of this type, one has the serial number 163 and one has the serial number 165. This habit of numbering each item made was followed by London watch-makers but not by scale-makers.

Again, the top quality workmanship is immediately apparent, and the erection and lowering of the columns, with their intricate hinges and sliding mechanism, is a sheer joy to the collector. And again, Brown deceptively refers to his patent, and uses the number of his design registration.

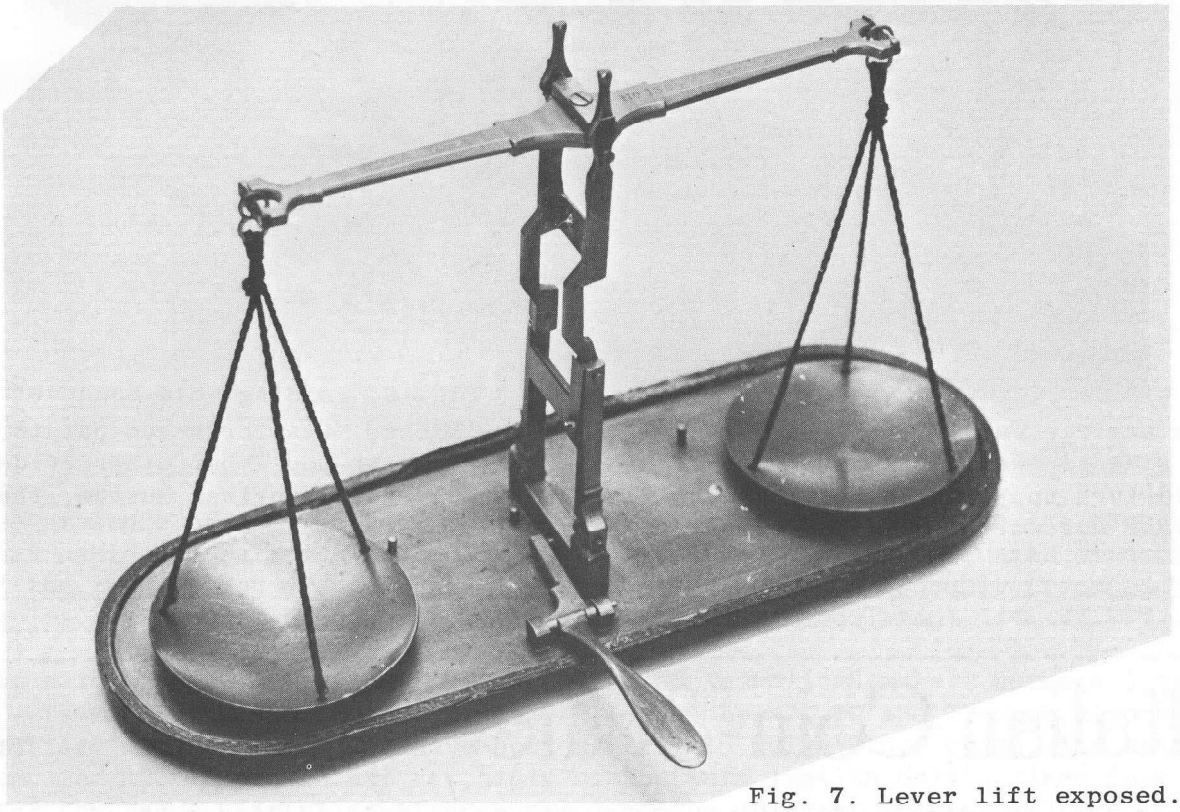


Fig. 7. Lever lift exposed.

Lastly, a tangle. Richard Brown and Son of Prescot, Lancashire, a watch-making village two hundred miles north of London, made a conventional folding gold balance for the sovereign and half sovereign stamped R^{d} Brown & Sons on the beam. See Fig. 8. Inside the lid is a paper label of instructions bearing the name of Will^{m} Williams, Scale Maker, 71, Cannon Street, London, but this label was pasted over another label bearing the name of ISAAC BROWN & SON !

So, did Isaac Brown get Richard Brown to make the balance under contract, sell it to William Williams, (who mainly made tea scales,) who retailed it in his shop? Could Isaac Brown have been a relation of Richard Brown's? Both were watch-part makers, but we have no evidence as to their relationship and they lived two hundred miles apart.

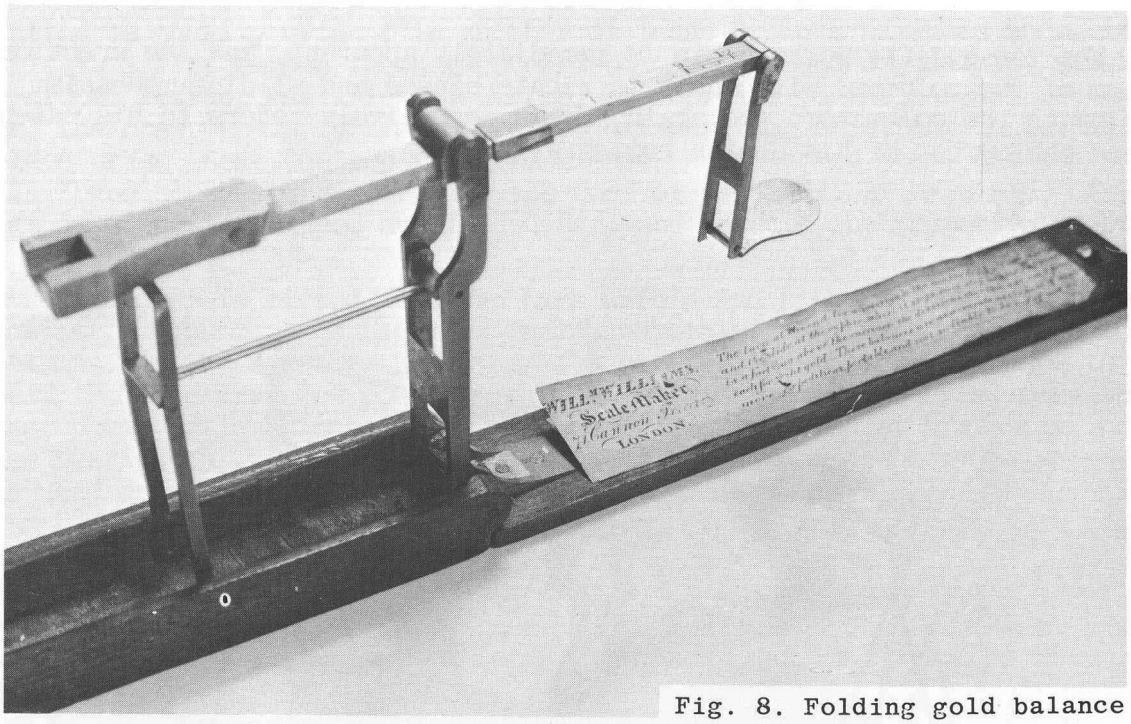


Fig. 8. Folding gold balance

This article was written about six years ago by Michael Crawforth and put to one side to await suitable photographs, and also in the hope that other evidence would turn up. None has. Thanks are given to the Avery Historical Museum, the Science Museum, London, and to Brian Brass.

Italian Coin-Scale

By G ZAVATTONI

This Italian coin-scale is in a wooden box 8x3x1 inch (21x8x2.5 cm.) Inside the box there is no label, but the following hand-written inscription;-

1. onza di Sec^{a} di Car^{i}.....3.00
2. zecc^{i} 2 venez^{i} C^{i}.....5.40
3. zec^{o} Nap^{no} di Car^{i}.....2.00
4. onza d'oro di Doc^{ti}.....18.00
5. mezza dop^{a} di Spag^{a}.....9.25
6. ?
7. dop^{a} Nap^{a} di docti.....4.00
8. Zecc^{i} 3 veneziani.....8.10
10. dop^{a} di do^{ti}.....4.50
11. ungar di Germania.....2.55
12. dop di Spagna.....18.50
13. zecch^{o} venez^{o}.....2.70
14. dop^{a} Nap^{a} di doc^{i}.....6.00
15. ?....francese di Car^{i}.....5.50
16. 3 pezze di Spagna di C....3.60
17. un ottava di Spag di Ca...2.25

The box contains seventeen square brass weights. A comparison between the inscription and the weights shows that, as is not unusual, these latter have been tampered with and partly replaced.

Nevertheless, eight weights bear the same reference number as the inscription and should therefore be considered part of the original set, (or at least part of the set which was assembled at the time the inscription was written.)

The presence of many weights for Southern Italian coins leads to the thought that Naples or Palermo was the production centre, and, as the units of account in the inscription are in Carlini and Ducati, they were probably produced in Naples, (the units of account in Palermo were Onza and Tari.)

Not all the eight 'original' weights were of Neapolitan make;- numbers 5 and 9 were made in Lyon, (maker's mark D P*), numbers 2, 10 and 15 were also possibly made in Lyon, but have been altered to weigh other coins. The weights numbered 12, 14 and 16 are certainly of Southern Italian origin since they bear the value, (in units of account ,) of the relevant coin.

In order to find out the date, reference should be made to the values of the coins mentioned by the inscription, since nothing has been published on Neapolitan scale-makers.

The little evidence found so far, points to values not fitting with the inscription. For example, number 3, (the zecchino Napoletano) is worth 20 Carlini and not 2 as is written. The clue is given by weight number 16, which bears the value of 36, while the inscription says 3.6. It is therefore evident that the writer either mistook Carlini for Ducati,(one Ducato equals ten Carlini,) or he flatly disregarded the zero. This lack of precision is not uncommon in the past; on the other hand, no contemporary user would have been fooled by this, since the concept of Ducati and Carlini as units of account was well understood by everybody. The values shown in the inscription hint at a manufacturing date of the middle of the eighteenth century, a 'terminus a quo' being the presence of the weight for the zecchino and for the doppia di Napoli, minted from 1743 onwards.

I do not know whether the scale is original; the beam could be later, (end of the 18th century;) the pans are circular, stamped with a central mark representing a crowned star surrounded by a circle of other stars.

The box is very finely made, with two large brass hinges decorated with engraved birds and dogs. It could be of earlier make than the weights, since the hole for number 14 appears to have been reduced from the original size in order to accomodate the weight. As it is, the box is far from perfect, but it is still a unique piece of Southern Italian make, and it gives an interesting light on the economic life of the period, in particular with reference to the extended use of weights and boxes.

(Editor's note: D P was the mark of Dominique Pascal, working 1722-c.1750.)

Avery? Fairbanks?

BY R GRICE

In issue no. 3 of the 1985 edition of EQM there appeared the item 'English Apothecaries Scales and Weights'. One of the types of scales described in the article, (Fig. 18, page 805,) was listed as being a Fairbanks machine c. 1920. The same scales are shown in Issue no. 3 of the 1987 EQM, (Fig. 7, page 1028,) where more information regarding the instrument is given.

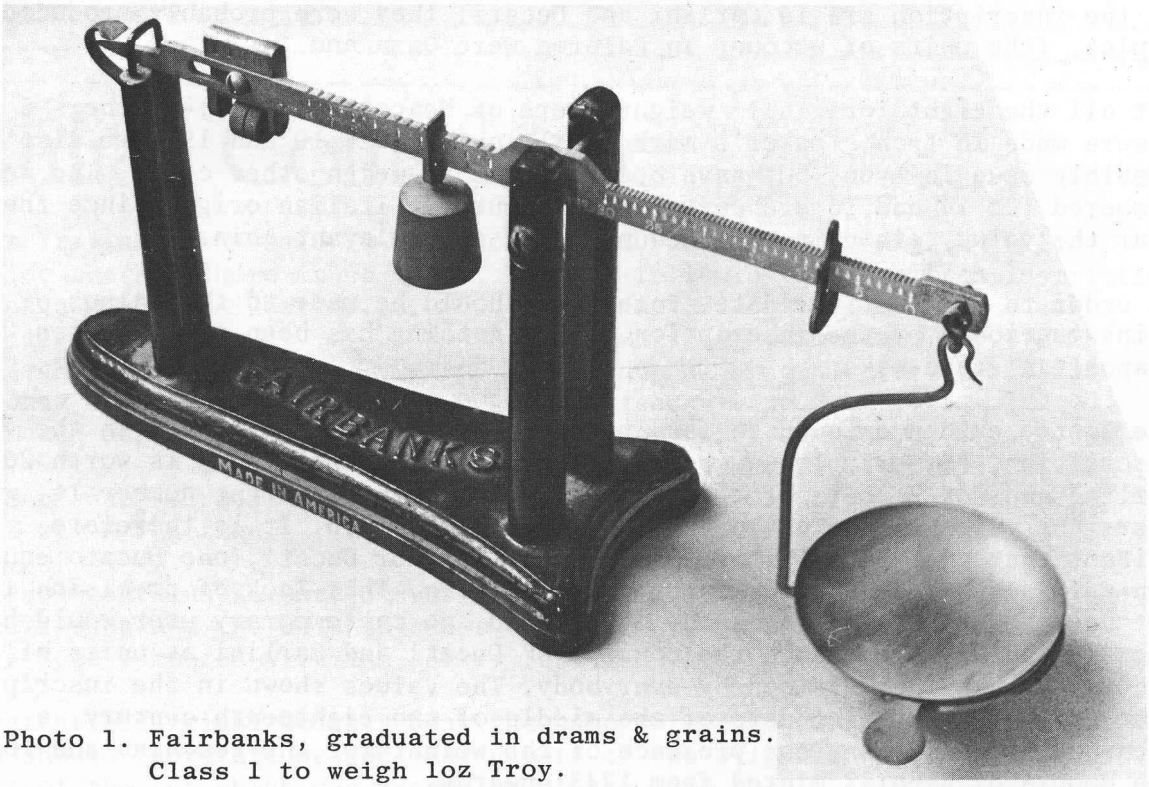
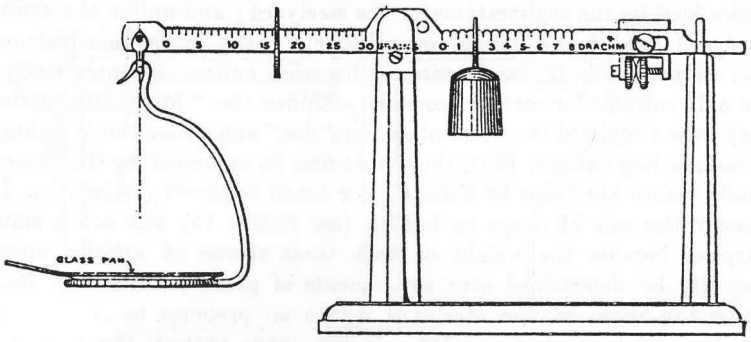


Photo 1. Fairbanks, graduated in drams & grains.
Class 1 to weigh loz Troy.



ONE-THIRD FULL SIZE.

Reproduced from drawings supplied by the manufacturers of the instrument.

Fig. 1.

Fig. 2(a)

The Board of Trade have examined and tested a pattern of a counter steelyard described as a dispensing scale, of the form herewith shown, submitted to the Department under the provisions of Section 6 of the above Act; but as the result of the examination was not satisfactory, the Board have declined to issue a certificate of approval.

Board of Trade,
Standards Department,
Old Palace Yard,
Westminster.

September 1905.

Detailed Description

This Notice refers to "a counter steelyard described as a dispensing scale." The term "counter steelyard" is correct, despite the fact that the main recording arm was shorter than the load arm for every weighing from zero, 0, to 8 drachms, a condition the reverse to that of the ordinary steelyard. The main feature in its principle of construction is that of an unequal-armed beam or steelyard. The latter is made of brass, nickel-plated, and notched as shown in the illustration. The fulcrum is near the centre, and is supported by bearings fixed in the top of the pillar, or left-hand upright of stand. A loop at the top of the right-hand upright serves as a "carrier" or guide for the end of the steelyard. That side of the steelyard which records the lighter weighings is graduated from 0 to 30 grains by ½-grain notches; and the other, or right-hand side, is graduated from 0 to 8 drachms by ½-drachm (30-grain) notches. The attachment at the "nose-end" of the steelyard is a balancing device. The whole arrangement had a range of movement within the limits of the slot in which it was fixed, and within those limits could be secured in whatever position was desired. This was held to be necessary in the process of manufacture to compensate for the varying weights of glass goods pans. Any small final adjustment in the balance of the instrument was effected by means of the two milled lock nuts operating along the screw at the under-side.

The application of the steelyard principle of construction was distinctly novel when applied on so small a scale for dispensing drugs. Unlike the ordinary assay beam, which determines a small fractional weight by means of a rider passing along its graduated arm, this instrument estimated the entire load by the registrations on the steelyard; and unlike the ordinary steelyard used for weighing comparatively heavy loads, this instrument was designed only to weigh one apothecaries' ounce. Counter steelyards are only suitable for certain purposes. Under the "Model Regulations" they were restricted for "manufacturers' use," and under the Weights and Measures Regulations, 1907, they must first be approved by the Board of Trade before they can be stamped for trade purposes (Regulation 104). Clearly the sale of drugs or bullion (see Notice 19) was not a suitable purpose, because the weight of both these classes of articles must of necessity be determined over instruments of great sensibility, a feature which the above counter steelyard makes no pretence to possess. This assertion can be easily supported. In the above pattern the principle of construction included that of the "accelerating machine," a feature partly responsible for destroying its efficiency as a suitable instrument for dispensing drugs. Under the Weights and Measures Regulations, 1907, an instrument of a capacity of 1 oz. and used by retail chemists is allowed an error of $\frac{1}{5}$th grain and a sensitiveness allowance of the same amount. But under the Model Regulations a turning allowance of one grain was permitted for Class 1 beam scales, steelyards, etc. Yet notwithstanding this much greater allowance it was found practically impossible to construct an accelerating steelyard which would return from its position of greatest displacement by the subtraction of one grain from the load in the goods pan. Moreover, any accumulation of dirt or verdigris in the notches which prevented the runner resting in its true position was sufficient to establish a greater error than could be tolerated.

Judged in the light of Regulation 104, which subsequently became law, this instrument had small chance of being approved: it was an accelerating steelyard; a counter steelyard; and of a capacity of less than 56 lb. Moreover, the balancing device had a range of adjustment out of all proportion to the capacity of the machine and might reasonably be held to facilitate fraud.

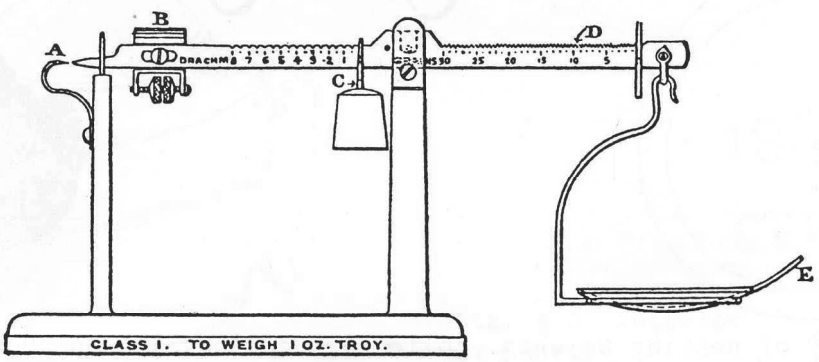
Fig. 2(b)

A similar type of scale has just come into my possession. However, the manufacturer of the scale in this particular case is W & T Avery, their name being cast into the base of the scale. Research has shown that the machine is identical to that shown in Fig. 1, which was submitted to the Board of Trade for a certificate of approval in September 1905.

The comments in Fig. 2 by the Board of Trade give interesting details regarding the scale, and their reasons for declining to issue a certificate of approval. Unfortunately, they do not state who the manufacturer of the instrument was.

In December 1905 a new design of this instrument, (Fig. 3) was submitted to the Board of Trade for approval. (This would appear to be the design shown in earlier editions of EQM.) Once again, however, the Board of Trade declined to issue a certificate of approval, their comments regarding the instrument being shown in Fig. 3.

(19)



ONE-THIRD FULL SIZE.

A. Indicator.
B. Sliding block held by a screw and readily movable.
C. Poise weight, readily removable.
D. Thickness of beam, $\frac{1}{8}$ inch.
E. Glass pan.

Reproduced from drawings supplied by the manufacturers of the instrument.

The Board of Trade have examined and tested a pattern of a counter steelyard described as a dispensing scale, of the form herewith shown, submitted to the Department under the provisions of Section 6 of the above Act; but as the result of the examination was not satisfactory, the Board have declined to issue a certificate of approval.

Board of Trade,
Standards Department,
Old Palace Yard,
Westminster.

December 1905.

Note

The instrument shown in this Notice is similar to that illustrated in Notice 15, except that the steelyard is made to vibrate instead of to accelerate; and is marked on the stand "To weigh 1 oz. Troy," despite the fact that the steelyard is graduated in terms of apothecaries' weight. The fact that this steelyard was made to vibrate did not overcome all the objections which could be urged against it. Reference should be made to our notes to Notice 15, which apply equally in this case.

Fig. 3

The author, Robert Grice qualified as an Inspector of Weights and Measures and was originally employed by the County Council of the West Riding of Yorkshire. His official verification stamp number was 298.

Russian Nesting Weights 2

BY L MARSON

In the category of nesting weights, collectors customarily include stacked weights housed in a special container, like the Russian types stacked in a shell with a domed lid.

These are rare items, seldom found complete. When only one or two components are missing, the completion of the set is readily visualised by filling in the vacant spaces with matching pieces of appropriate weight and shape. In this fashion, a full nest or stacked pile is reported sometimes in the literature. This has been my experience too, until I found one incomplete set, which, by deviating from the rule, seemed to have been designed in an unorthodox configuration, not reported and never encountered before.

This set consists of an awkward mixture. About one half of the housing is filled in one way, with weights shaped as stacking rimmed discs, and the other half in another way, with weights shaped as upright, knobbed pins. At first, I thought that the mixture was a trivial ensemble of remnant pieces. On a second look, upon investigating the anomaly of the content, I had to reconsider my first appraisal, in favour of a realisation that the mixture might also be fragmentarily representative of what the original orderly composition of the set might have been at its inception.

Such a possibility seems, at present, more conclusive than a speculation one can arrive at by associating miscellaneous observations gathered around other Russian weights of the domed type.

With this comparative approach, the objective is achieved by describing two commercial sets I have on hand, of the same size, 96 Solotniks each, dated 1881 and 1900 respectively, fairly alike, with their characteristic domed lid housings, designated here as Set A and Set B, where Set A is the normal (or usual kind,) and Set B is the abnormal set, the one with the awkward mixture.

An analysis of their features leads to a critique which justifies the conception of a mixed composition proposed for Set B.

The 1881 set, Fig. A1, is a barrel shaped house with convex sides, measuring 1¾ inches, 42 mm, (diameter of the base,) by 2 inches, 51 mm, (height at the highest point,) It is composed of a master shell marked with the date in the interior of the base and a number 48 plus the letters CTP, cyrillic for STR, of unknown significance. It contains five stacked flat cups, Fig. A 3 shaped like discs with

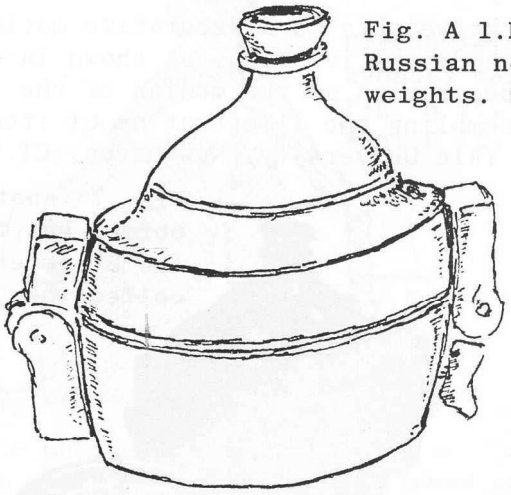


Fig. A 1.Normal Russian nesting weights. 96 Sol.

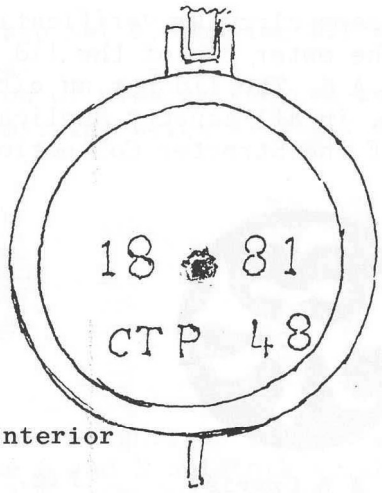


Fig. A 2. Interior of housing

a rim, shown in cross-section..They are in a progressive sequence of the duodecimal system, (24, 12, 6, 3, 2...) each nesting half way into the shallow cup below, to form a conical pile, Fig. A3. All components of the set are marked in the inner bottom with the denomination number and with the crowned double-headed Czarist eagle, pictured as an enlarged sketch in Fig. A 5

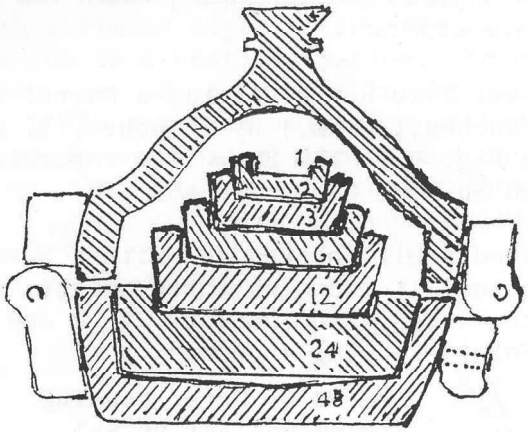


Fig. A 3. Cross section through normal set, See Houben, fig. 37, reproduced on page 1431.

The missing weights are the smallest, obviously one shallow cup with a fitted disc of the same weight,,half Solotnik each, to make up the one Solotnik denomination needed to complete the 96 Solotniks. No signs of adjustment are detectable. No mark or stamp appears on the outer bottom, except for the smallest cup, numbered 2, which has a mark 2_3 in smaller characters, interpreted as 2 S for 2 Solotniks. A single circular verification mark stamped on all pieces is placed over the denomination number, as illustrated in Fig. A 4, making the whole group an aesthetically homogenous entity. The high degree of uniformity of the total series leaves no doubt about the composition and the nature of the two missing weights.

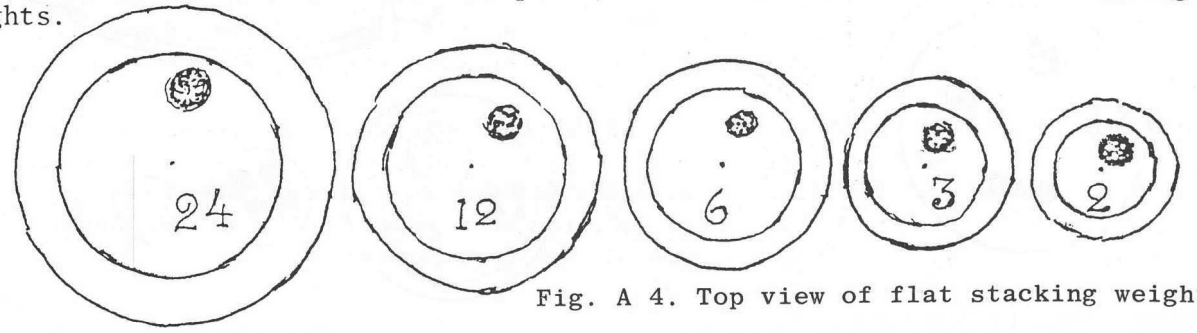


Fig. A 4. Top view of flat stacking weights.

The same circular verification stamp found on the weights is a decorative motive on the outer top of the lid near the centre of a decorative ring, as shown in Fig. A 6. The lid has an exterior double ring decoration at the median of the dome, in all aspects duplicating or closely resembling the illustration of item 65 of the Streeter Collection, Fig. 7, kept at Yale University, New Haven, CT.[1]

Fig. A 5 Czarist double-headed eagle, crowned.

Fig. A 6 Top view of outer housing

Fig. 7. another normal set, from the Streeter collection.

The theoretical mass is 409.5 grams per Russian pound. The actual mass is 205.6, 102.6, 51.4, 25.7, 13 and 8.5 grams.

Set B is also a commercial set like Set A. It has a barrel shaped housing with convex sides, measuring 1½ inches, (40 mm.) by 2 inches, (51 mm.), being the base diameter by the height. See Fig. B 8. The domed lid resembles that on Carl Moennig's weight illustrated in EQM, pages 278 and 279.

The set is composed of a dated shell, marked 48, with a czarist eagle stamped on both the inner and outer bottom. It contains three weights marked 12, 6 and 3, (see Fig. B 9.) It therefore misses denominations 24, 2 and 1, the three weights needed to complete the 96 Solotnik total sequence.

Fig. B 8. Outer housing of unusual set 96 Sol.

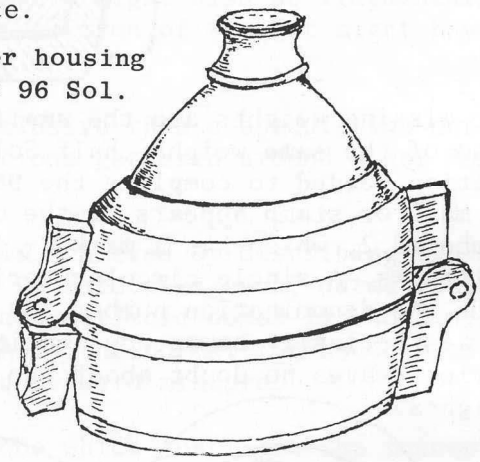
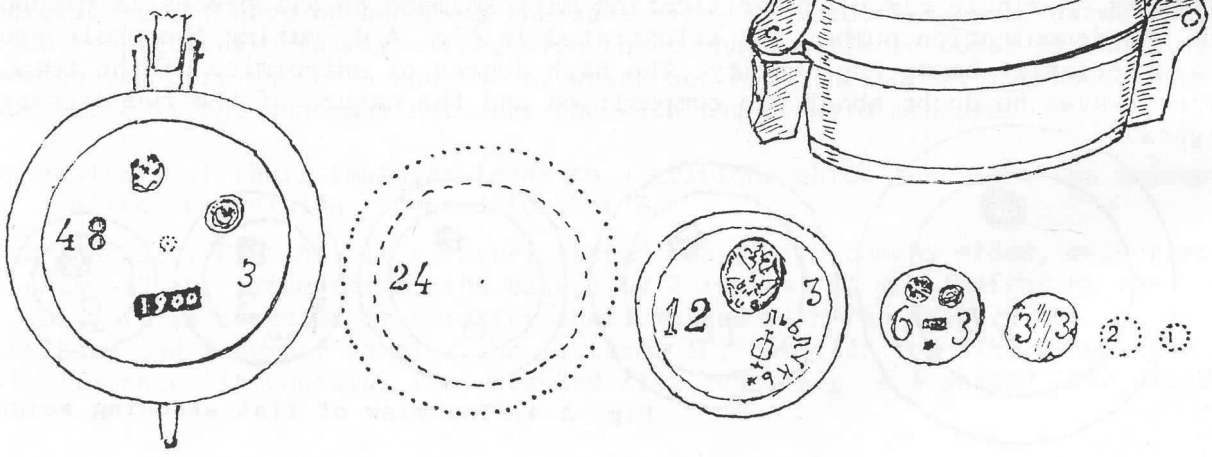


Fig. B 9. Interior of housing, missing 24 S, Flat 12 S, knobbed 6 & 3 S, and missing 2 & 1 Solotniks.



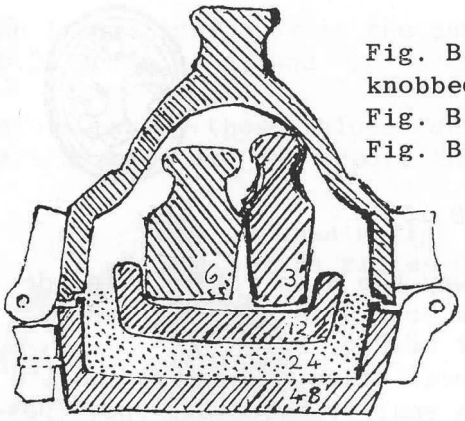
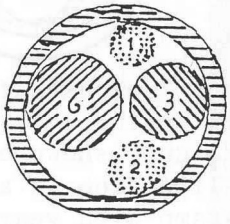


Fig. B 10. Cross-section through Set B, showing fit of knobbed weights in the housing.
Fig. B 11. Theoretical position of missing knobbed weights
Fig. B 12. Probable shape of missing weights, 2 & 1 Sol.



The unusual feature of this set is that the 12 Solotnik weight, as to be expected is a rimmed disc of the stacked cup type, whereas the 6 and 3 Solotnik weights are, unexpectedly, barrel shaped, with a flat knobbed top of about the same diameter as their tapered bases. The height of the knobbed weights, 3/4 inch, (19.5 mm.) and 7/8 inch, (22 mm.) is less than the internal diameter, 1 1/4 inches, (26 mm.) of the 12 solotnik cup, where the knobbed weights fit in either standing up or upside down position. This observation suggests that the missing weights were obviously of two different basic shapes. A missing 24 Solotnik piece must have been a cup shape, with a rimmed edge fitting the lidded house and able to accommodate the 12 Solotnik cup in a nesting fashion, whereas the missing 2 and 1 Solotnik weights must have been of an upright knobbed shape, matching the 6 and 3 Solotnik 'pin' weights. The pin type weights must have been resting in the cavity of the 12 Solotnik rimmed weight so that pins and cups were sitting together in a double nest arrangement. Study the cross section shown in Fig. B 10 and the horizontal section at an imaginary rim level, shown in Fig. B 11, where the dotted parts demonstrate where the missing weights fitted. Fig B 12 shows the probable shape of the missing pin weights.(1)

Fig. B 13.

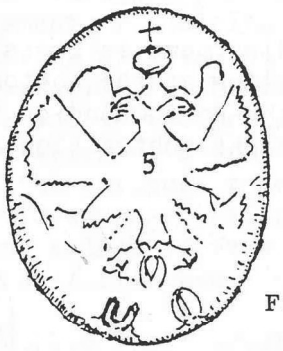
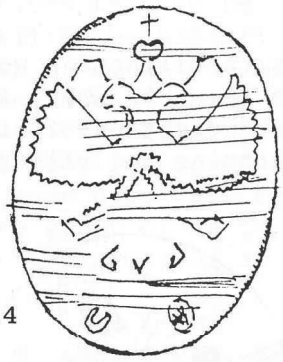


Fig. B 14



The configuration and the height of the knobbed weights do not follow a single prototype model. However, the knob of the 6 Solotnik weight seems well matched by vaguely resembling the upper top of the housing domed lid, even though without duplicating exactly its proportions. See Fig. B 21.

The many verification stamps applied to the inner and outer bottom and on the top of the knobs are

1..A double-headed eagle of Imperial Russia in a circle or an oval. See an enlargement of their approximate design in Fig. B 13, 14 and 15. The outer stamps are less clear than the inner ones, due to damage or distortion by filing for

Fig. B 15.

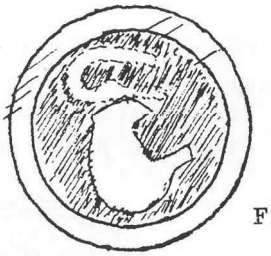


Fig. B 16

Fig. B 17

adjustment. The corruption is demonstrated by the way the 5 is distinct inside the cup, shown in Fig. B 14 on the left, but cannot be distinguished on the stamp on the outside of the cup, shown on the right of Fig. B 14.

2..An unclear, mermaid-like blob in a round or oval frame. Fig. B 16 and 17.

3..A rectangular date stamp with year 1900 and a smaller illegible one, (possibly 1861,)shown in Fig. B 18.

4..A semi-circular arcuate marking in obsolete cyrillic letters stamped in the cavity of the 24 Solotnik piece: ФЛЬБЛУКЪ * A drawing of its enlargement appears in Fig. 19. (2)

5..Other generic markings are the value denominations 48, 12, 6, and 3 with a figure 3 in each, the cyrillic for the letter S, the abbreviation for Solotnik. See Fig. B 9.

Fig. B 18

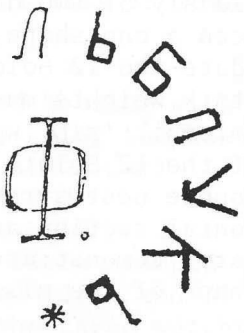


Fig. B 19

Sharp filing for weight adjustment is grossly evident at the bottom of the housing shell, (Fig. 20,) light filing at the bottom of the 12 Solotnik cup. The 3 Solotnik weight has filing on the bottom and on the top, with evidence of routing, chipping and filing for weight subtraction on the knob and along one side. (3)

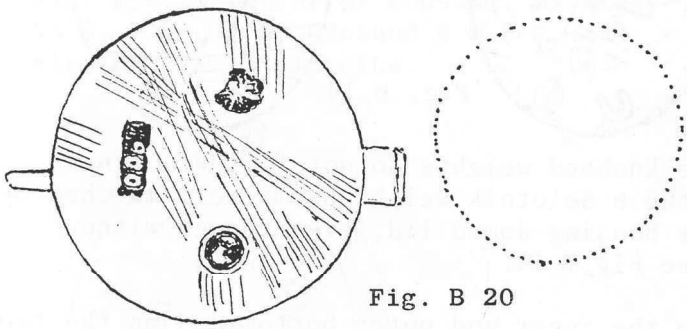


Fig. B 20

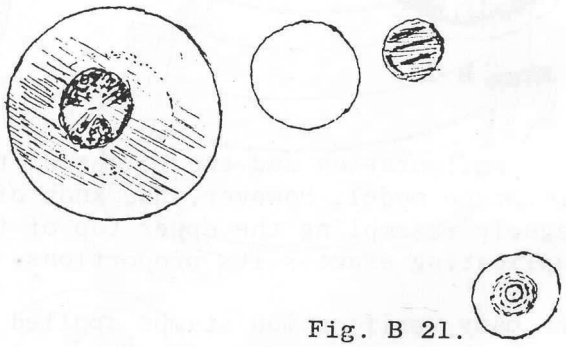
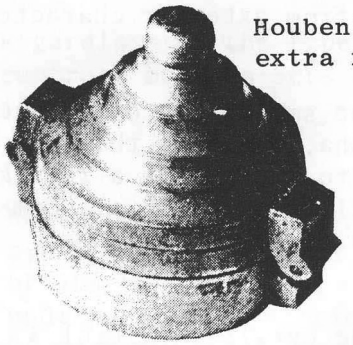


Fig. B 21.

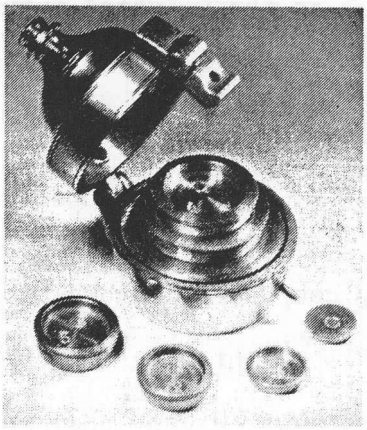
Noticeable decoration marks are three outer rings on the housing shell, one on the lid and two on the base. Traces of multiple concentric rings are visible on the flat surface of the lid knob. See Fig. B 21.

The theoretical mass is the same as that of Set A. The actual mass is 204.6, -, 50.9, 25.5, 14.4, and -.

Unfortunately these values cannot be compared with the Moennig's set because Carl Moennig did not report the weight.



Houben's Fig. 52. Note extra ridges on dome.



Houben's Fig. 37. A stunning normal set.

COMMENT

A preliminary perception of the weights' arrangement in the nest comes forth from a cursory review of the sets' description. Based on the actual mass and on the fit of the weights, the arrangement is obvious for Set A, but open to arguement for Set B. For a clarification of the Set B, two more confirmatory elements of judgement are considered, the set's integrity and the weights' mutual affinity.

Since the unknown integrity of an item is often connected with its known commercial availability, alias rarity, the chances for adulteration should decrease as the rarity increases. Then, when an item has loose components, its alteration by inclusion of extraneous substitutes, even though appropriate, should tend to be a remote possibility, unless the replacement or addition is justified by historical events. In the case of the Russian nesting weights their rarity is notorious. It is evidenced by the scantiness of information in the literature, and by their conspicuous absence in antique markets and in the pertinent auction catalogues. That being the case, a fraudulent alteration of a set, or a correct replacement of its parts, (called a 'marriage' in the antiques trade,) is made difficult by the poor availability of substitutes. To suppose that an entire group of units was replaced by pieces of corresponding values after a hypothetical loss of a single component, seems likewise just as farfetched.

Among old Russian weights, even the knobbed 'pin' weights, in my experience, are uncommon when bearing Czarist stamps. Consequently, in line with this logic of probabilities, it is unlikely that knobbed weights of extraneous source have been removed from their proper, maybe just as rare, setting, to be exploited as foreign fillers in Set B. It is more likely that the knobbed weights, or their substitutes of the same shape, were components of an integrated set.

It is also unlikely that any intentional manipulation has taken place to enhance its prospective commercial viability because the Set B was not offered for sale as such. And, if a replacement occured merely to fill vacant spaces, the logical intent of the assembler would be to complete the entire set.

However, the incomplete condition in which the set was found, suggests instead that it was a fragment with an unaltered original condition. This leads one to conclude that an assurance of apparent integrity stems directly from the rarity of the set itself.

As far as the weights' mutual affinity is concerned, and its effect on the assessment of the weights' arrangement, this emerges readily from exterior characteristics:

1...The three weights of 12, 6, and 3 Solotniks have a fine smoothness of surface and an even, light yellowish shade of brass colour, or patina, matching the housing shell. Such superficial evenness to the touch and to the eye is a remarkable aesthetic effect, which acts as an indicator of mutual affinity in all components. It is a 'reasonable' uniformity among the group suggesting the same alloy composition and closeness of age.

2...All weights, master shell included, are marked with the cyrillic initial З for Solotnik. The style of the initial is constant for the weights of 48, 12 and 3 Solotniks, except that for the smallest one, the 3 Solotniks, it is proportionally smaller, in harmony with the smaller size of the weight. On the 6 Solotnik weight it is slightly of different configuration, or the deviation is a distortion attributable to the hammering angle. In any case, the trend suggests no exception in the presence of such markings throughout the series.

3...The symbolism of Government verification expressed in the form of a pair of round stamps on the 6 Solotnik weight, conforms to the way that the same symbolism appears, as a pair of stamps, on the housing piece, the 48 Solotniks. The same applies to the date mark. A rectangular stamp, even though illegible, repeats in smaller size the motive and function of the rectangular date mark stamped on the 48 Solotnik piece. The two marking features, of a round stamp with an eagle on it and of a rectangular stamp with a date mark, present characteristically on both weights, create a circumstance of analogy above that of accidental nature, and elicit special affinity between the largest of the knobbed weights and the housing piece.

The concurrence of these relationships in spite of the shape difference of the weights points out a concealed mutual pertinence that leaves one perplexed. It permits one to gather the pieces in a fitting group by value denomination without necessarily segregating them by shape. It strengthens the opinion that, should even some substitution have occurred during the set's life span, the persistence of a combination of exterior common traits is not a casual coincidence. It testifies that the weights, together with the calulated missing homologues, constitute an appropriate blend belonging to a single system.

On this basis, there are two theoretical ways to fill the vacant spaces of Set B, a plain, uniform shape, standard arrangement without upright knobbed weights, or alternatively, a continuous double nest, mixed shape arrangement according to the illustrations in Fig. B 10, 11 and 12, utilising the pieces of the set in its present condition. Unquestionably, the alternate mixed arrangement is just as compact as the other. Its correctness is vouched for by both apparent integrity and superficial affinity. Being also in accordance with the observed fit of the odd shaped pieces in a double nest scheme,(1) this proposed mixed arrangement

constitutes an unusual model, convincingly suitable as a working model of experimentation, and just as realistic as the known models. In the selection of the best working model for the most appropriate arrangement, it is the best option for the Set B, because it utilizes all the available pieces and it reproduces an ingeneous practical composition, easy to handle and to pack, that was probably designed before their manufacture.

Regardless of the type of arrangement selected for Set B, there is a significant contrast between Sets A and B, which is accentuated when the concept of affinity is qualified.

While the mutual affinity in a mixture of old weights is a subjective, not rigorous, criterion, its variability could be distinguished, at its most noticable, by its two extremes, One extreme could be called 'constant' and reflect an undisputed morphological similarity and sequential analogy of the pieces, typical of mass-produced, mechanically tooled items, and characterized by minimal expectancy of deviations. The other extreme could be called 'irregular', and reflect a crude functional similarity and moderate specificity, peculiar to manual, hand-tooled artifacts, and characterized by occasional exceptions. Both kinds of variability provide a guiding pattern in screening acquisitions, and applied to Sets A and B, they outline an aspect of the sets' contrast with a new perspective, as follows.

Set A displays the first kind of variability whereby all pieces are shaped like a single, standard prototype. Each piece is marked with one stamp. The stamp is identical, and of the same size in all components. The year date is cast into the outer cup. All the pieces are consistently free of the cyrillic initial З for Solotniks, at least in the interior. (See the exception in the description of the 2 Solotnik cup.) Thus, the absence of the Solotnik initial is not only a common trait, but perhaps also an indication of late manufacturing or modernising trend. The pieces form an orderly sequence and their consistency in uniformity allows almost no exception. For instance, in the stamped denominations the style of the 4 is the same in the 48 and in the 24, but the style of the 2 is the same in 12 and 2, but different in the 24. (See Fig. A 4.) In all other respects Set A constitutes a homogenous, aesthetically uniform group of weights.

Set B displays the irregular extremity, whereby elements of repetitive features, such as the markings and their relative location, as well as of difference, are traits in common. The differences, however, are not necessarily implying drastic lack of uniformity. The prevalent common denominator in this uniformity is parallel to the situation of the Carl Moennig weight set (shown in EQM on page 278 and 279,) taken as an appropriate reference point, where the affinity between pieces, such as that of the markings, varies, but the variability is related to a change of size or limitation of space. See, for example, the 6 Solotnik cup differing from the others by missing the stamps and the date, which is still appropriately matched to the rest of the set, in spite of the missing stamps. Likewise, the 6 Solotniks counterpart in Set B, differing in shape from its 12 Solotnik homologue, but bearing stamps and date marks as in the 48 Solotnik outer cup, making it an acceptable, fitting component in the anticipated series. Then, either type of arrangement, single or mixed shape, is based on an irregular variance of their mutual affinity.

In this way, the contrast between Sets A and B leads to a correlation with a differentiation in age and usage, by observing that the first kind of variability suggests a standardized model and a late production vintage, whereas the second kind suggests an earlier production, regardless of the arrangement chosen, and is peculiar to an older model which received additional verification marks for validity, 1897 for the Moennig's set and 1900 for Set B. The conclusion can then be drawn that weights with uniformity traits in accordance with the characteristics of a definite model such as Set A, represent late versions of Russian nesting weights, probably from the period ranging from the end of the 19th century to the First World War, and that those with moderate traits of uniformity reflecting the characteristics of an optional model such as Set B represent older versions of the same objects, probably obsolete precursors from before the middle of the 19th century, still used at later dates.

Surely the question of whether the knobbed weights of Set B are a postumous addition or a replacement for the original, lost cup weights, remains ultimately unsolved, and there is probably no way to prove or disprove an answer to the controversial issue of the original configuration of an incomplete set before alterations occured. Yet, whatever the correct answer will be eventually, the fact remains that a choice of arrangements, either plain, as exemplified by Carl Moennig's description, or mixed, as described in Set B above, is theoretically applicable to the old models of Russian nesting weights.

Should this view be shared by the reader, we must be aware of the inherent uncertainty whenever an incomplete set is reported in the literature, and be on the alert for eventual revisions.

While it is advisable to investigate further the general category of these attactive nesting weights, this study encourages the collector to pursue alternative avenues of research in the search for substantiating clues.

NOTES

(1)..A brass reconstruction of the missing 24 Solotnik cup satisfying the above requirements permits one to ascertain that a set of 24, 12 (as piled rimmed discs) 6, 3, 2 and 1 (as knobbed barrels resting in the highest cup,) designed as illustrated in Fig. B 7 to 20, fits the original master house in a compact, non-rattling pack.

(2)..The literal translation is F.LBLUK*, probably a manufacturer or local Government mark. In the old cyrillic alphabet Л ь is the equivalent to л ь for soft L sounds. The last letter ь is an obsolete character no longer in use.

(3).. Danforth, Ellen Zak,..Nesting Weights. A Catalog of Nested Cup Weights in the Edward Clark Streeter Collection of Weights and Measures. Published for the Connecticut Academy of Arts and Sciences by Archon Books, Hamden, Connecticut, 1988.

(4)..The adjustment of the 3 Solotnik weight is apparently unfinished because its actual mass, 14.4 gm, is in excess of the theoretical value of 12.8 gm. In contrast, the 6 Solotnik weight has no visible filings and its actual mass, 25.5 gm, is within the first decimal accuracy of its theoretical value.

BIBLIOGRAPHY

(1)..Danforth..ibid.

(2)..Kisch, Bruno,...Scales and Weights, Yale University Press, New Haven and London, 1965. Reprinted more recently.

(3)..Houben, Gerard M M...2000 Years of Nested Cup-weights, published by the author in 1984. Available from the author, at Hugo de Vrieslaan, 8024 BM Zwolle Netherlands.

(4)..Moennig, Carl...EQM, pages 278 and 279, 1980.

This study was prepared shortly after the death of Michael Crawforth, and is dedicated to the memory of our past editor, with an expression of esteem and recognition of him as teacher and friend.

Trial of the Pyx

BY D F CRAWFORTH

In about 1980, Michael Crawforth offered to repair the antique coin scales belonging to the Goldsmiths' Company. He enjoyed handling their scales, appreciated the sincere thanks that he received and went on to other things.

About two years later, we were amazed to be invited to witness the Trial of the Pyx, to be held at Goldsmiths' Hall in St. Ann's Lane, (now called Gresham St) and we were also greatly flattered to be participating in an event which had been conducted regularly from about 1200 AD. We got in a fluster, trying to find out what was expected of us on such a historic occasion. We got permission to miss two days work, (an amazing concession by Sunderland Education Authority!) We bought smart (London type,) clothes, and travelled up to London with an intense feeling of anticipation.

The Hall had its normal dignified appearance outside, but inside all was bustle and nerves. Guards loomed in the entrance hall, up the stairs and in the corridors, watched, with quiet amusement, by austere portraits of past Masters of the Company. The Dining Hall was converted into the Trial Room and was transformed into a shimmering delight. At the head of the room were velvet-lined alcoves filled with the most choice antique gold dishes, flagons, ewers and cups belonging to the Company, some hammered out four hundred years ago in the most flamboyant style by members of the Company. The gold was brilliantly lit by spot lights. Being the most important pieces in their collection, each item was covered with the most ornate chased, hammered and cast gods, fruit, swags and ornament, with light reflecting into the eyes of the stunned witnesses from all angles.

The hundred or so witnesses settled down on beautiful old chairs along one side of the room, wondering what we were to see, as the only clues were a high table

on the raised platform in front of the display of gold, and long, refectory-style tables in a line down the room. In front of each chair was one brass bowl (like a large nesting weight,) and one wooden bowl, (like a large porridge bowl.) We gazed round the mirrored walls, admired the immensely tall, Queen Anne windows, wondered why the huge length of velvet did not rip at the top of each curtain and watched the dappled light from the crystal drops in the line of impressive chandeliers, feeling very insignificant.

Then a procession entered, apparently straight from the time of Henry Vlll. The Master of the Company brought in the Queen's Rememberancer, the Queen's representative, and the Court of Assistants followed respectfully, all dressed in coloured wool gowns, like bright university gowns, with knee-breeches and silver-buckled shoes. The Queen's Rememberancer wore an eighteenth century style wig, giving us the feeling that we were the ones in the wrong clothes.

After a solemn speech by the Queen's Rememberancer to the jurors, reminding them of their duty to keep the coin of the Realm in the most accurate possible condition, the jurors sat at the long tables, under the eyes of the Queen's Rememberancer and the Court of Assistants. The Pyx, ('pyxis' is the Latin for 'little box,') was opened and we could see the thousands of coins that had accumulated during the year, as, routinely, every so often, one of the normal production of coins at the Royal Mint was removed from the production line and 'posted' through the slot into the Pyx. There were samples of every coin, large and small, made at the Mint.

We watched a small part of the checking, as the coins were examined and counted into the wooden bowls, and then carried into other rooms in the Hall, to be assayed and weighed.

Michael was very disappointed not to witness the meticulous weighing, as, just occasionally, some coins were found to be under or over-weight;- both faults being considered equally bad errors. Nowadays, the financial loss to the State is not great if the coins are over-weight, but formerly, the State lost substantially if gold coins were too heavy. Nowadays, the worry has more to do with slot- machines, and the primitive scales inside them refusing to accept the coins.(We had a huge batch of 10 p. pieces in the early 1970s which were too light, and were rejected by slot-machines,so the whole years' production had to be sorted out by Banks, as they passed through their hands, and returned to the Royal Mint, causing expense to the firms who maintained the slot-machines and to the Royal Mint.)

The assaying of the gold and silver coins was done over two days, as each coin had to be melted down in a furnace, alongside a small piece of the gold or silver Trial Plate, so that the purity of each coin could be compared with the purity of the Trial Plate. The Trial Plates gradually get used up doing the annual Trials, so new Plates have to be replaced by new ones, made to a specified Standard of purity with the greatest precision, so that the coins never vary in their gold or silver content. Gold and silver coins are not normally made for use in Britain, but the Royal Mint makes them for other Governments, and for use in trade with countries where the populace only trust genuine sovereigns! No announcements were made as the the quality of the coins checked at the end of the first day, but at the end of the second day, all were found to the correct.

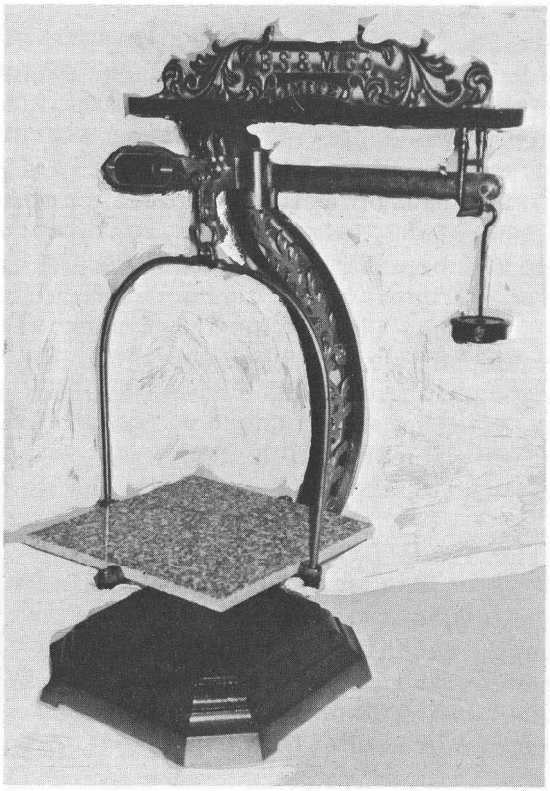
The Trial being over for the day, we dispersed, leaving jittery guards and dignified officials hovering near the gold. We had participated in an important safe-guarding of our humble pennies and our gold sovereigns, feeling that we represented all the members of ISASC, especially those who own assay and bullion balances, coin scales and precision balances.

In recognition of the debt that we owe to Susan Hare for inviting us to Goldsmiths' Hall, giving us such a memorable and fascinating visit.

Canadian Butchers' Scales

By H ALLAN

This magnificent butchers' scale has 'B S & M Co. Limited' cast into the silvered foliage at the top of the scale. The foliage rests on a red support from which is suspended the stirrup which holds captive the end of the steelyard. The steelyard hangs from a curved pillar formed by two red strips with gold foliage between the strips. The octagonal base is painted red and gold. The meat was placed on the marble pan, which sits on a cross-spider suspended between two curved hangers. The whole scale is about 3 foot 6 inches, (105 cm.) high.



This scale is featured in the 1910 catalogue of Wood, Vallance and Adams of Calgary, Alberta. It states that the scales were made by Burrows, Stewart and Milne of Hamilton, Ontario, Canada. Number 261 was a Butchers Scale with Counter Stand, with Nickel Plated Brass Beam with Sliding Poise, Marble Slab, Cast Iron Stand, finished in red and gold. It weighed 50 lbs, (23 kilos.) by 1 oz increments, with 12 inch, (30 cm.) tray, beam marked to 10 lbs. weighing up to 70 lbs. It cost ₰ 26.50, (factory price $ 17,) stamp net $ 50. One in a box weighed 65 lbs.

Salter in Berlin

BY S VAN BEEK

In the summer of 1989 I travelled to Berlin and was compelled to undergo patiently all the stringent measures of the ruling Communists.

The purpose of my journey was to find out what my employer, Salter Industrial Measurements Ltd. (previously Geo. Salter & Co. Ltd.) of West Bromwich, England, did in Germany many years ago.

Immediately after the end of the First World War, the Managing Director, Mr. E William Bache, requested my predecessor, Mr. Louis Heijermans, to sell all the remaining properties belonging to Salters in Berlin. He completed the sales by about 1920.

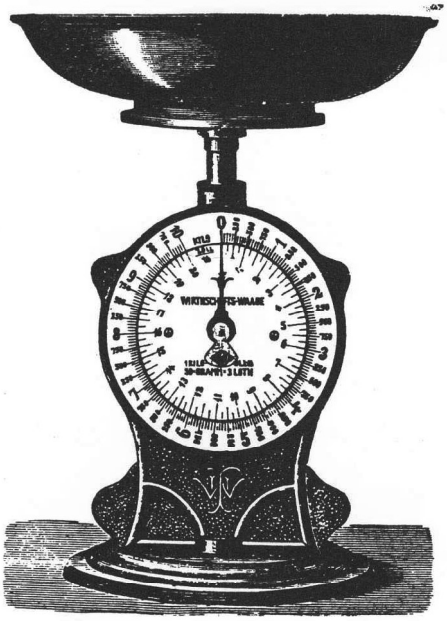
While in Berlin I had the pleasure of meeting several enthusiastic members of our West German sister club, Mass und Gewicht Verein fur Metrologie e.V.One thing led to another and eventually I was put in touch with, among others, Johannes Lindler, an expert in handling microfiche. He found out the following for me.

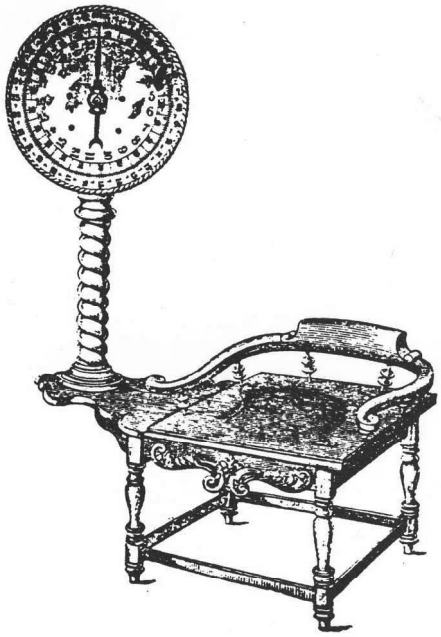
In 1882 Carl Ubrig agreed to a partnership with one of his brothers, and on 30th December 1882, altered the registered name of his company to Ubrig's Waagen-fabrik Gebr. Ubrig, Berlin.

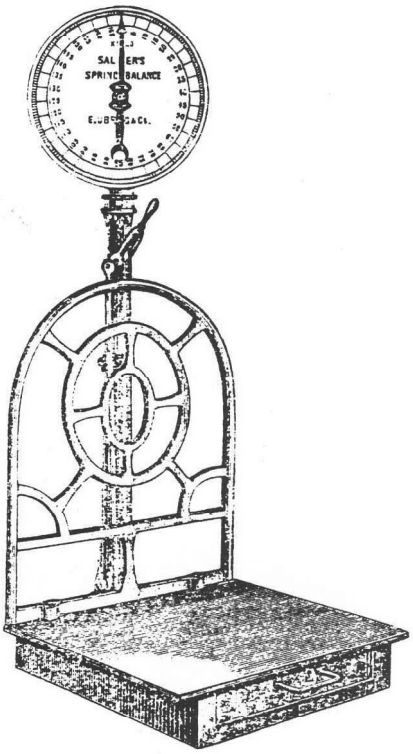
Probably the Ubrigs needed financial support, as on 1st October 1883, the name of the company was changed again to E. Ubrig & Co. The official statement refers to George Salter of West Bromwich near Birmingham as the new partner with Heinrich Carl Christian Ubrig. See right.

In the Trade Directory of 1886, E Ubrig & Co. were mentioned as manufacturers of, among other things, technical springs, spring balances and slicing machines, and as being owned by E Ubrig and G Salter jointly.

In unſer Geſellſchaftsregiſter, woſelbſt unter Nr. 8477 die hieſige Handelsgeſellſchaft in Firma:
Ubrig's Waagen-Fabrik Gebr. Ubrig
vermerkt ſteht, iſt eingetragen:
Der Waagenfabrikant Heinrich Carl Chriſtian Ubrig zu Berlin iſt aus der Handelsgeſellſchaft ausgeſchieden. Der Fabrikant George Salter zu Weſt Bromwich bei Birmingham iſt am 1. Oktober 1883 als Handelsgeſellſchafter eingetreten.
Die Firma iſt in:
E. Ubrig & Co.
geändert.







All illustrations from E Ubrig & Co's catalogue of 1892.
Fig. 1. Salters' 1867 Patent with Ubrig's trademark. Available with two springs, with taring knob or with larger spaces between graduations for units 0-1 kilo.
Fig. 2. Counter Packet scale with locking handle.
Fig. 3. Person scale also shown in Salters' catalogue of 1877.

In 1888 a new address was registered, in the Furstenbrunnerweg, Westend, Berlin, very close to the railway station for Westend, and for Charlottenburg.

In the catalogue printed in April, 1892,E Ubrig & Co. made mostly German designs of weighing devices. They made ornate top-pan household balances, still with their old trade mark of a monogram of U W f; , but also sold the plain Salter design with the Ubrig monogram added. They made person weighing machines of Germanic design but also sold Salter designs with a face graduated in Stones round the outer edge and kilos on an inner ring,(without mentioning Salters.)

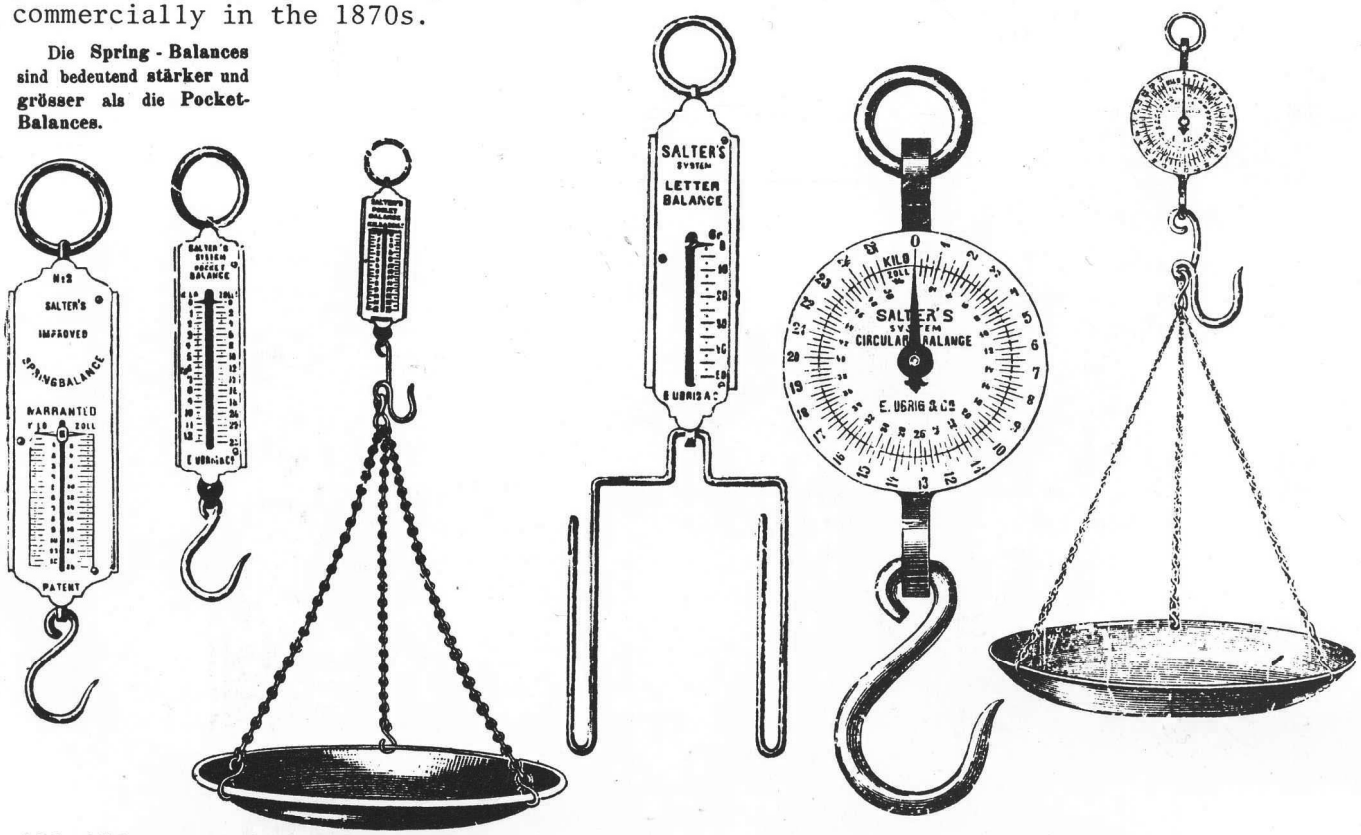
The 1892 catalogue did show balances with the Salter name on the face, with the writing all in English, but with German units of measurement, Zolls and Kilos.

They also sold dynamometers for testing the strength of wire, rope, cloth or hoop iron, etc, stating that they went up to 15000 kg, but with the illustration showing the graduations only in tons by cwts. Presumably Salters sent their printers block to be incorporated into the German catalogue. The same English illustrations were used for their Stock weigher and their package scale, but E Ubrig & Co. was superimposed on the graduations.

The 1892 catalogue also showed Salters letter balances, actually headed 'Letter Balances' instead of Briefwaage!

In parenthesis, Salters scales were being sold by Steinfeldt and Blasberg in Hannover in the same year, as demonstrated by their catalogue of 1892. Krups were retailing them in 1905, and E Cohn was selling Salter scales at about the same time, (see Mass & Gewicht, page 175.)

By 1896 Emil Ubrig, engineer, had left the company and the Berlin Trade Directory mentioned only George Salter as the proprietor, although the name E Ubrig & Co. was retained. By 1896 the company was known as an iron foundry and as a machine works, specialising in producing household apparatus, (already well represented in their 1892 catalogue,) patented balances, automatic machines, (penny in the slot,) for the sale of sweets, cigarettes and tickets. Special attention was drawn to the fact that the company was able to galvanise metal with zinc, a process that was still comparatively novel in 1896, having been introduced commercially in the 1870s.



All illustrated in 1892 Ubrig catalogue, all clearly stamped Salter and Ubrig.
Fig. 4. Spring balance 0-12 kilos. Fig. 5-6. Pocket balances 0-12 kilos.
Fig. 7. Letter balance 0-50 grams. Fig. 8-9. Circular balances 0-50 kilos.

By the end of the 1890s it was Mr. John O Tonkin who was in charge of the Berlin activities, and in 1905 he was appointed Director of E Ubrig & Co. Apparently business flourished, as the Berlin Trade Directory for 1906 indicated that Ubrigs established an office and showroom at 38, Wilhelmstrasse, in the centre of Berlin, as well as having the factory at Furstenbrunnerweg in Westend.

Automatic meal-delivery machines are regarded as a modern development, but Ubrig were making such machines in the early 20th century, at their Berlin factory.

Up to 1906, Ubrigs were mentioned in Berlin Trade Directories, but after 1907 nothing was in the respective Directories or in the Trade Registers. A lot of historic documents were lost during the two World Wars and unfortunately it was impossible to trace the company. They could have changed the name of the company as there was a reference to 'Saltersches Haus', so I might have another look at appropriate papers in due course.

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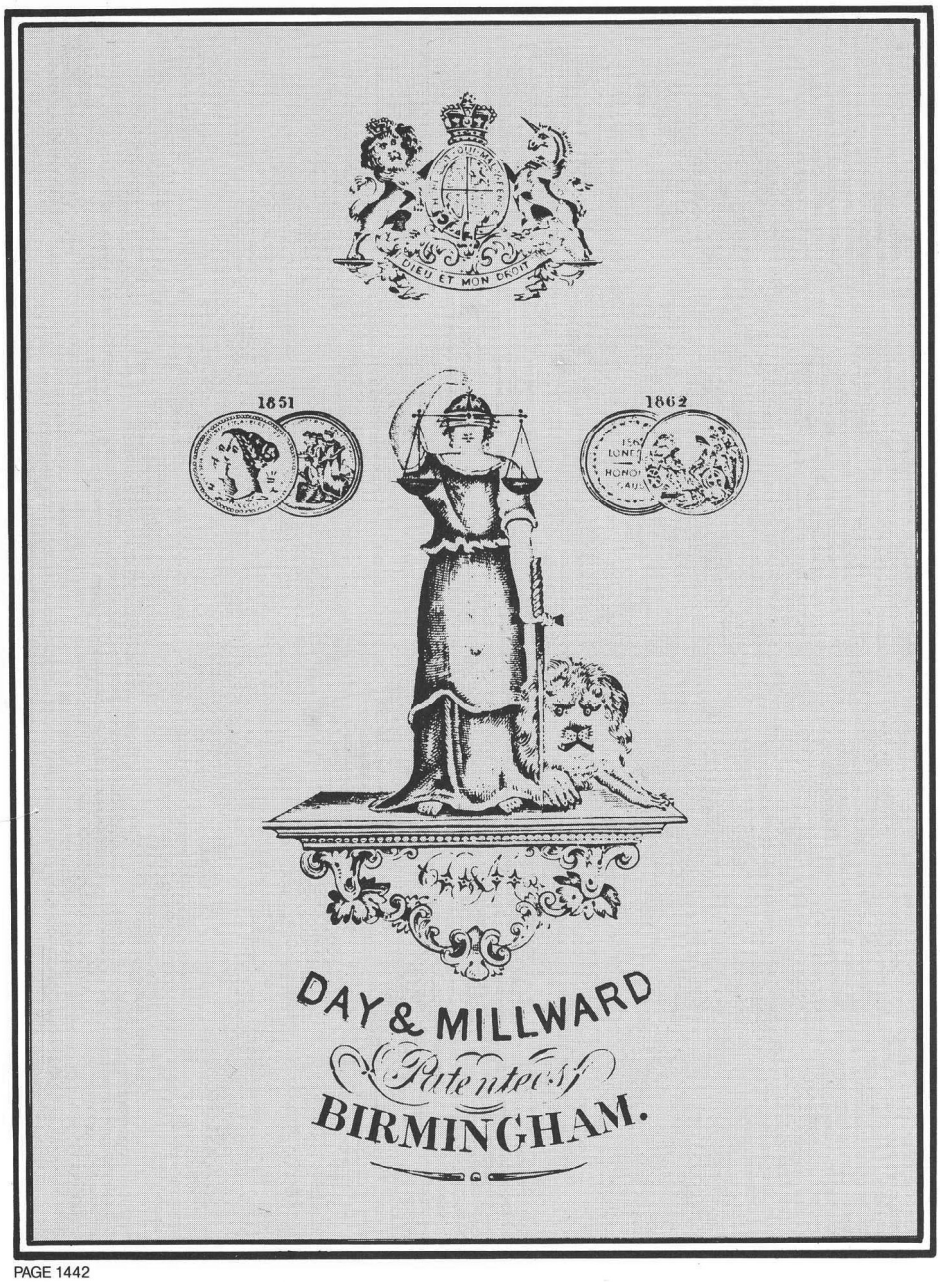

Cover Picture

In England, between 1840 and about 1960, pottery plates were used on scales for weighing food. In the USA marble was the usual material. Both materials had the virtues of being easy to clean, but both were heavy and bulky, needing to be counterbalanced by lead blocks under the weight pan. If the pot or marble broke, a new plate was purchased, and the lead blocks were adjusted to balance again.

This square plate , of which only the central part is shown, was made by Day and Millward in about 1870, when the firm was still proud of having won two medals at the Great Exhibitions of 1851 and 1862. They implied that they were suppliers to the Royal Household by using the Royal Coat of Arms, although they did not quite have the audacity to put 'By Appointment."

'Day and Millward, Patentee" referred to the patent that they held on what they called an "Agate Beam", which looks like a normal, flat iron beam with flat swan neck ends, but with the hole in the swan neck enlarged and made exceptionally heavy, presumably so that an agate bearing could be inserted in the ring. This would have circumvented Sharkey's patent for agate bearings in a box end.

Day and Millward also made numerous variations of equal arm beam scales supported on pillars, which they called 'Lion Agate Scales, Registered'. The registration actually covered the decorative base of the pillar, with its four lion's paws supporting the rectangle of metal, and nothing else. However, by using the lions' paws on every conceivable scale, they could claim a lot of 'Registered Scales' and they probably got a lot of unwarranted protection.

They also registered, on August 13th, 1861, an 'Imperial Weighing Machine' or inverted Roberval, with the central column swelling out on both sides above both the weight plate and the provisions plate. They were careful not to spell out what they had registered;- perhaps it was something as trivial as lion feet. Day and Millward mystified the public yet again by registering the design of their Vibrating (or French) Counter Roberval Scale, in June 17th, 1881. No obvious design features show any originality.

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Porcelain, China or Pot?

BY D F CRAWFORTH-HITCHINS

It is difficult, in this age of ubiquitous plastic, to imagine what things were like in the nineteenth century, running a shop which sold food, in its natural state. I was a little girl in the middle of the twentieth century, yet I remember vast blocks of butter and cheese sitting on the grocer's counter, which the shop assistant attacked vigorously with a huge knife or a wire with two handles. I remember carcasses dripping blood onto the sawdust sprinkled on the floor and onto the coats of the unwary customers. I remember the damp brown sugar being scooped out of a sack into dark blue paper bags, that invariably softened and disintegrated on the way home, oozing sugar over the contents of the shopping bag. I remember gleaming fishes sparkling in the sunshine, looking so pretty, but smelling a hundred yards away. I remember the tripe stall selling blankets of the slippery innards, (and my fear that my mother would succumb to her economical leanings and make us eat the squelchy stuff) dripping the moisture in which it had been soaked. Even in 1970, I remember reprimanding my butcher for cutting me a piece of meat, and turning to the cheese and cutting me a piece of cheese with the same knife.

Fig.1. S Banfield Ltd. Scalemakers 1932-1962
Fig.2. H Pooley & Sons Ltd. Makers 1910-1930
Fig.3. SCWS. Scalemakers. Mercy prevailing?

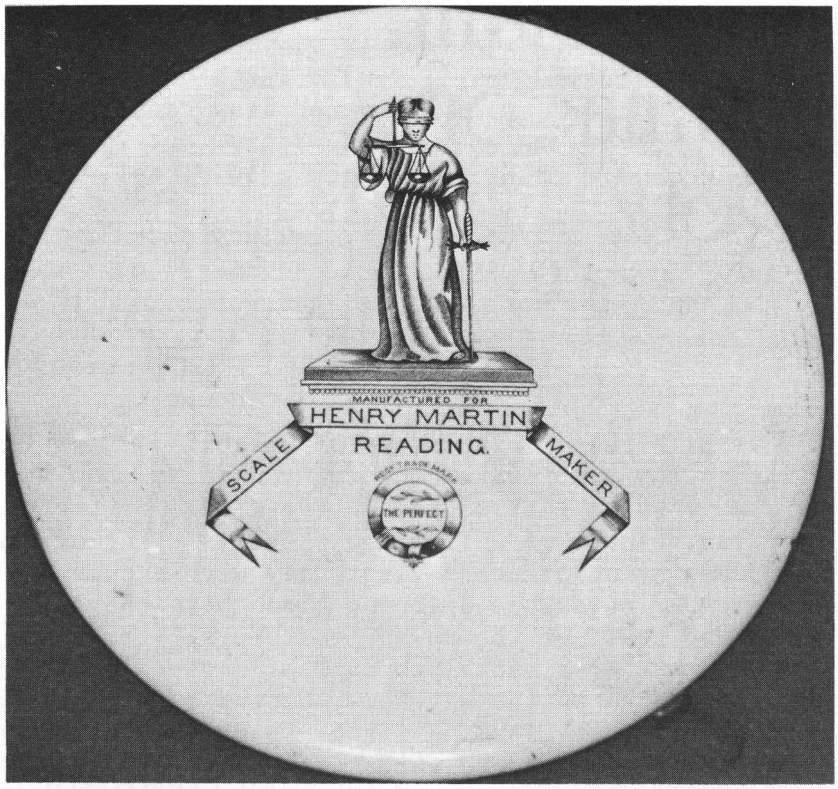


Fig.4. E Jackson & Co. Scalemakers 1908-1949
Fig.5. H Martin. Scalemakers. 1869-1913

Fig.6-9 opposite page. J White & Son, Scalemakers, descendents of John White (est. 1715,) Sixth generation 1883. Still working. White Bros. & Co. Scalemakers, Seventh generation split off 1898, rejoined 1964.

Each of these foodstuffs had to be cut and weighed out in front of the customer and yet there were no wash-basins in the shop. What did the scales and weights look like, after just one transaction? As you can imagine, they were spattered with blood or coated with fat, which was roughly wiped off with a damp sponge ready for the next transaction. It says a lot for our antibodies that we got stomach infections so rarely, but little about our intelligence that a hundred and fifty years of knowledge of bacteria still hadn't modified our behaviour adequately.

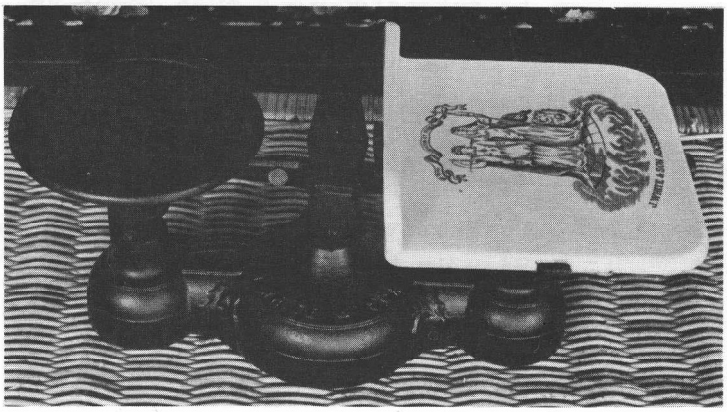
Yet in the 1830s, the public had started to desire cleanliness, and had started to look at scales critically. The seams in scoops trapped grease and fat, the linkage of roberval scales got covered with sticky deposits, the pillars of inverted robervals got caked with dried blood and weights grew imperceptibly smoother in appearance and heavier as the indentations slowly filled with dirt and fat. Over the next sixty years more and more scale makers offered shopkeepers an alternative to brass, iron, pewter and tin, called 'porcelain' in their catalogues, but in fact they were offering pottery parts.

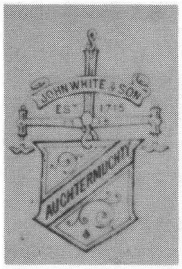
Why did scalemakers use easily broken pottery when they could use tough brass or cheap iron? As the diatribe above highlights, pottery could be washed or scoured frequently without damaging its surface. It looked clean and hygienic. The name of the company (either maker or user,) showed up distinctly. It could be brightly coloured. It looked very smart to have matching scales and weights. Any damage was clearly visible to the customers, which reassured them.

A very marginal argument was presented in the 'Mechanics Magazine' in 1836. 'Mr. Juggins a dealer in butter and cheese, of James St. Covent Garden London, has for the past five years, employed a plate of glazed porcelain, instead of metal, which need not be wet, is clean and there is no sensible loss of weight due to scouring.' The magazine explained to its readers that 'metal dishes must be wet to prevent butter adhering, so that the true weight of butter is less than apparent, and that in hot weather, metal dishes must be scoured two or three times a day, so making the scale dish too light.'

This evidence, that a scale-user wanted his scales to look clean in 1831, is one of the few facts that we have concerning early 19th century attitudes to food handling. The demand for 'wipable' weights must have risen, as Avery's were offering porcelain weights in their catalogue of 1849.

In 1859 Edward Dowling took out a patent which mainly concerned the application of glass to scales, but the patent had one clause concerning porcelain;- 'Forming scale-pans or plates --- of porcelain with a lip turned under which embraces the arms or ring supporting the scale-pan, notches being cut in such





A GLOSSARY OF TERMS USED IN THE POTTERY TRADE IN ENGLAND

BODY the clay and any bits added to it to make it hold together better, be less brittle, move better on the potter's wheel, or to look whiter.

CHINA often used to refer to household objects made of clay with a white glaze, even when the body under the glaze was red, grey or pink. Always glazed. Usually middle price range.

EARTHENWARE slightly porous, opaque pottery fired at a low temperature, about 700°C. Not tough and easily chipped. Cheap.

FIRING the process of putting piles of pottery (well dried, to prevent water expanding into steam and exploding,) with tiny vitreous legs between each piece, into an oven, pumping clean, hot air through the oven (to prevent carbon adhering to the surfaces,) until the clay melted slightly and fused into one piece, then cooling the whole oven without opening it over two or three days, (to prevent violent contractions and thus splitting.)

GLAZE literally glass. The diluted clay into which the body was dipped, to give the desired surface colour. The first glaze was usually white, then decoration was applied, (hand-painted or transfer-printed) then another clear glaze was washed or rolled over the whole to protect the decoration and to make an impermeable finish. Usually the object was fired after the first application of glaze, to do the major fusing process, then the decoration and the final glaze could be subjected to a much lower heat on the second firing, yet still fuse together.

POTTERY commonly used to mean cheap clay objects, often not glazed. Also used for the building in which any clay-based craft or industry took place.

PORCELAIN Correctly used only for very fine, translucent objects. Incorrectly used in the scalemaking trade, when they referred to china objects. The author would have preferred to use the term 'china' throughout but felt that less confusion would be caused by sticking to the scale-trades terminology.

Soft paste porcelain was fine, thin bodied china, delicate to hold, white bodied, fired at a high temperature, and for many years the best porcelain available in England from English potteries.

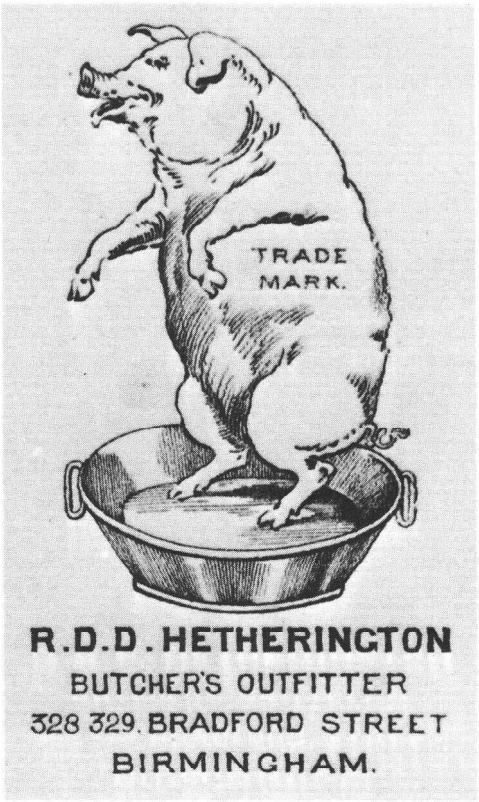
Hard paste porcelain was the finest, most translucent, hardest, whitest body, fired at high temperatures. Very attractive, very expensive and widely copied by inferior potteries. The name was wrongly used (as by the scale trade,) to denote 'quality'

STONEWARE body composed of a high proportion of pure clay without additives fired at exceptionally high temperatures, over 1200°C, to cause far more fusing within the body than is normal with other pots. This high degree of vitrification produced a non-porous body without the need for glazes, and gave a surface finish very like stones or pebbles, rough and pock-marked.

Fig.10

Fig.11

Fig.12 My favourite!



a lip to permit of the scale-plate or pan dropping on the support; it is then partially tinned round to keep it in position.'

The trapping of the porcelain plate seems an odd modification if cleanliness was a priority. Almost all scale plates handled by the author could be removed from the scales, and many were so loose as to be in danger of falling off the scales with the smallest bump.

Fig.13 Parnall & Sons Ltd. Scale-makers, 1889-1940

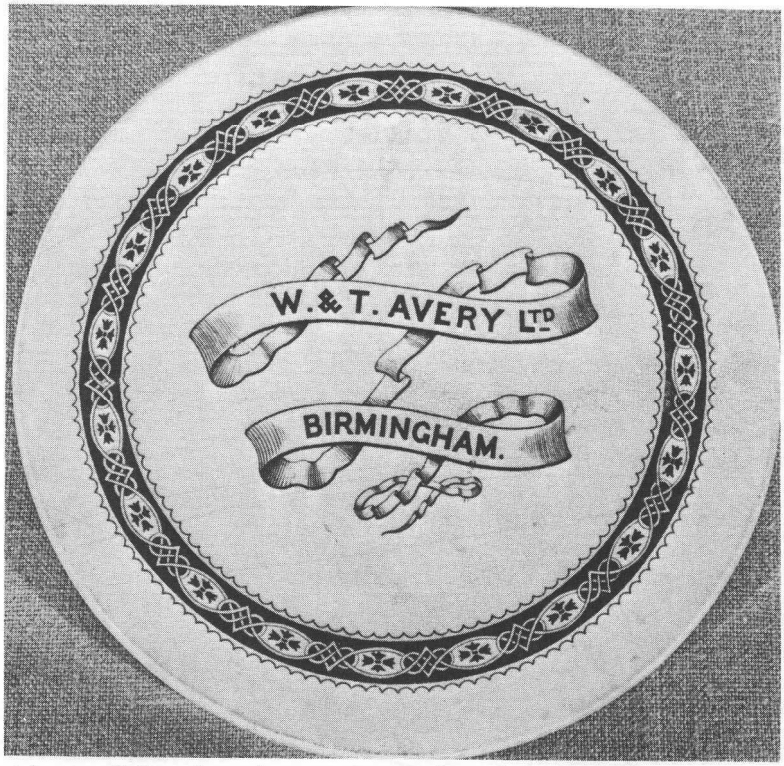
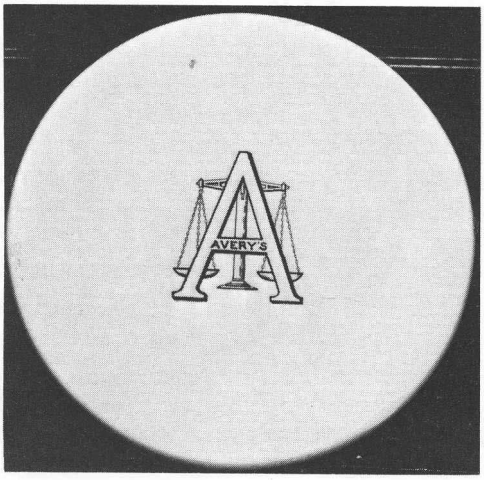


Fig.14 W & T Avery Ltd. Scalemakers 1891-continuing. Design in use 1880-1898

In 1869, a Corporation of London inspector of weights and measures stated to a Standards Commission, that he always refused to stamp porcelain weights because they 'are not according to the 1835 Act of Parliament', although inspectors 'in the country' will stamp them. In the same year, William Cave Fowler, of the firm of Nicholl and Fowler, London, told the same Standards Commission that 'Porcelain weights are always made with knobs; those are used by shopkeepers, and are made in sets from 7lbs down to ounce'. Fig.19(a.) So obviously inspectors of weights and measures stamped them for shopkeepers in some areas, a fact confirmed by the evidence of the Inspector for Middlesex 3 District, who was asked, 'Do you compare earthenware or glass weights and do you ever stamp any

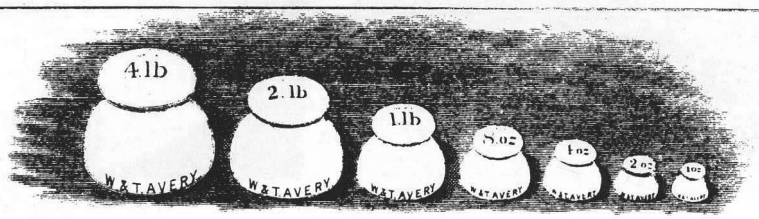
Fig.15 Anderson Brothers, Scalemakers 1870-1940

Fig.16 Avery. Date unknown.



such weights, that is to say, weights other than of iron, brass, or gun metal?' to which he replied,'I stamp both china and glass weights. I stamp several china weights.' In parenthesis, this question proved that the Inspector was not sticking to the letter of the law, which did not include mention of porcelain or glass, but did include iron, brass and gun-metal.

The Warden of the Mint asked Fowler whether porcelain weights were very largely used, to which he replied,'Not largely used. There are serious objections to them. They are very clean and look very nice for cheesemongers, but they absorb the water. If they put them in a pail of water to clean them, they absorb the



1880 catalogue

CHINA WEIGHTS,

Plain white, or ornamental designed Porcelain Weights, loaded with lead.

			3/8	5/4	7/4	10/6	15/2	24/6 per set.		
Plain white			½	1	2	4	7	14 lbs. down to 1 oz.		
			7d.	9d.	1/-	1/4	1/8	2/-	3/2	4/8	9/4 each.
,, ...			1	2	4	8 oz.	1	2	4	7	14 lbs.
			6/-		8/9	12/-	16/9	23/9 per set.		
Ornamental designed			½		1	2	4	7 lbs. down to 1 oz.		
			1/-	1/4	1/8	2/-	2/9	3/3	4/9	7/- each.
,, ...			1	2	4	8 oz.	1	2	4	7 lbs.	

water; it gets between the interstices of the weight. I have sent some samples here, from which I could show in a moment what I mean. Here are two 1lb. weights on the table filled and the other not filled. They have to be prepared first and have lead poured in them. If they are not prepared first by process, the weight will split, but when this weight is immersed in water for the purpose of cleaning, the water collects around the interior of the weight, and they therefore

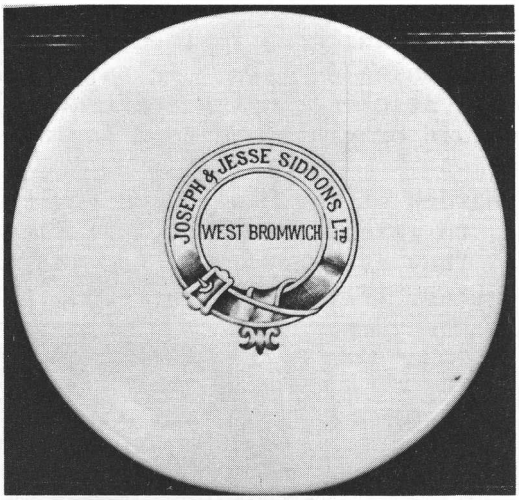


Fig.17 Anonymous plate, typical of 19th century. Used by makers and retailers

Fig.18 J & J Siddons. Scalemakers 1888-1926.

are objected to; there is a further objection to them, that when the juries are seen coming round, if the person has those weights at all light, they put them in a pail of water and make them heavy, so that they deceive the jury. But I do not place any reliance upon such an objection as that. My chief objection to them is on account of their large bulk, on account of their liability to fracture, because it is a glass surface, and on account of their suction; they can never be extensively used from those three causes. A 71b. porcelain weight is very large.'

Cheesemongers had a particularly hard time keeping their weights up to standard If they used porcelain weights, they could be accused of intentionally allowing water to soak into their weights, but, if they used brass, the corrosive salts in the cheese could lighten the weights significantly within three months. The scale maker, Skinner, of Webb and Skinner, 185, Union St, Borough, London, gave evidence that cheesemongers had the most rapid deterioration of the mass of their weights of any trade he knew, except those of chemical works.

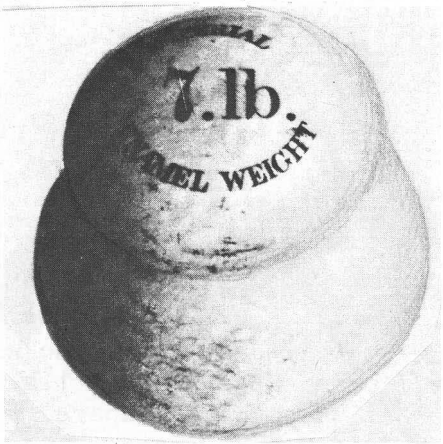


Fig.19(a). Large 7 lbs. 'Enamel' weight sold by Essen Auktion V, May, 1989.
Fig.19(b). Superb little weight by J T Shenston. Date unknown. Museum of the History of Science, Oxford.

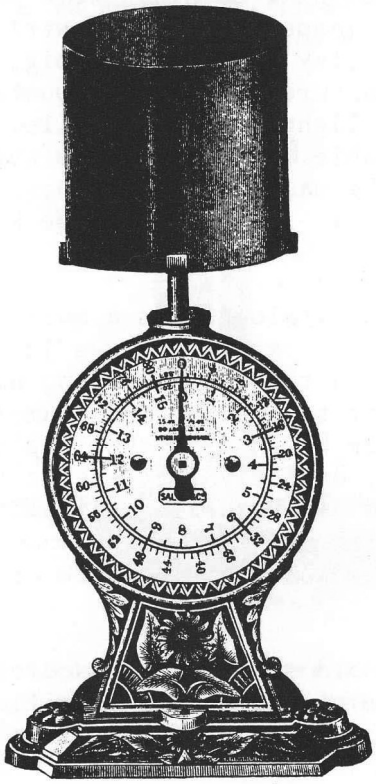


Fig.20. Salter's Porcelain dialled Corn Scale in their 1893 catalogue.

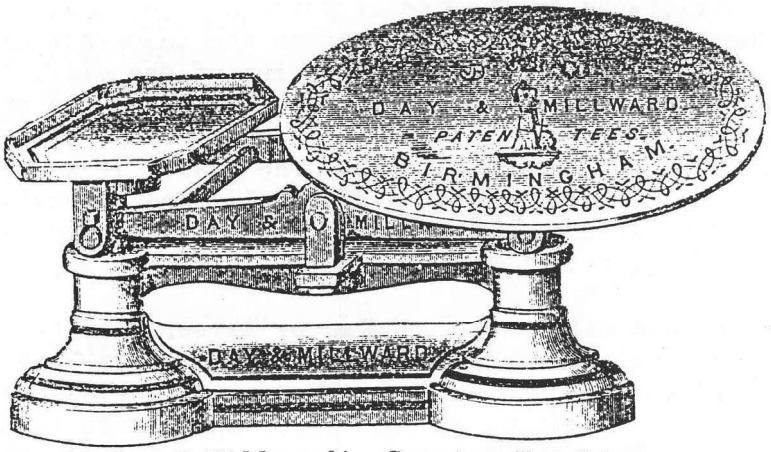


Fig.21. Day & Millward's Counter Weighing Machine, 15% dearer with coloured border. 1889

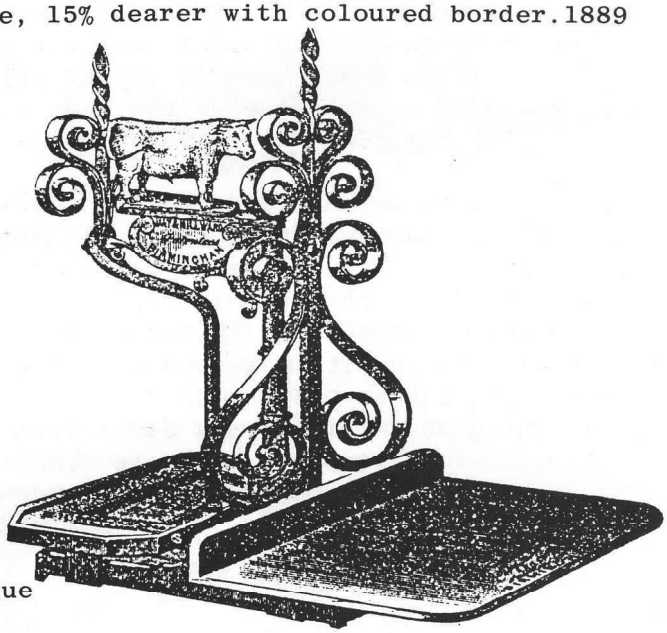


Fig.22. Day & Millward's inverted Roberval with porcelain plate for butchers, 1889 catalogue

Another argument given to the Standards Commission by Fowler was that 'shopkeepers have discontinued the use of them, (brass weights) because when a customer comes in-----he might put a 41b. weight in his pocket, and then go round to a marine store shop and sell it for 6d. or 7d. a pound---- which has in great measure driven brass weights out of use.' Obviously a porcelain weight had no scrap value and was safe from shoplifters.

S R Short of Degrave, Short and Fanner, said that 'the majority of shopkeepers weights are made of iron, some few of porcelain, and the small ones of brass,' which reinforces the argument that, in spite of their being no law stating that porcelain was legal, it was commonly used and commonly stamped by inspectors, (albeit, outside the City of London.)

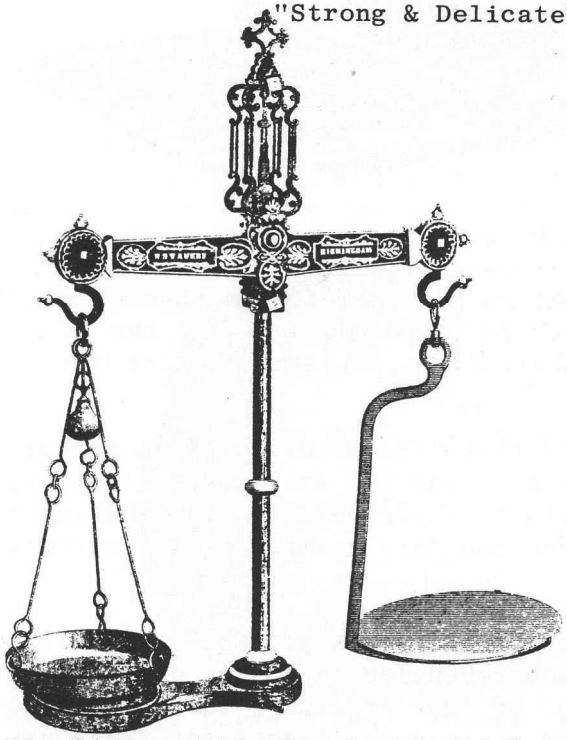
As porcelain weights were offered to shopkeepers in the scalemakers' catalogues up to 1889, but no longer included in the comprehensive catalogue of Avery's in 1906, we must assume that the Act of 1889 or of 1904 precluded the use of such weights, and that inspectors would no longer stamp such weights for trade use.

Restrictions on the use of porcelain for scales and weighing machines were not due to Acts of Parliament or to the idiosyncracies of inspectors. The restrictions were due to the innate properties of the clay. If the clay part was too big, it was very heavy and liable to be broken as the scale was wrestled along counters. If a clay part was too thinly constructed, to keep it light, it was fragile. If it was too exposed a part of the scale, it was vulnerable. However, there were parts of scales that could usefully and decoratively be made of porcelain;- graduation dials, plates, covers, pillars and bases, all of which could be kept clean and bright without wearing away.

Porcelain dials were offered by Salter's in their 1893 catalogue, as a more expensive alternative to enamelled iron or brass, but the extra cost was justified on the grounds that,'These will not discolour, and the figures being burnt in (sic) cannot be erased. Their appearance is superior to that of the enamelled dials.' The porcelain versions were available on letter balances with a top pan for use in the home, on counter parcels-post balances, on equivalent scales for manufacturers and merchants for calculation of a gross of objects, (basically the same scale as the household letter balance, but with a differently graduated dial,) and on a corn balance, (the same again, but with a bucket in place of a top pan.) See Fig.20.

Porcelain plates were offered by all scalemakers who sold shop counter scales between about 1840 and 1960, either as general purpose plates or for specific food trades, such as dairies, grocers or cheesemongers. Roberval scales were normally offered with the more expensive option of a china plate, and the even more expensive option of a coloured china plate (Fig. 21) The plates were always flat, occasionally with a raised rim on round plates, and occasionally with one lip raised, on square plates.

Fig.23 W & T Avery's Stand Scales
"Strong & Delicate" 1880.



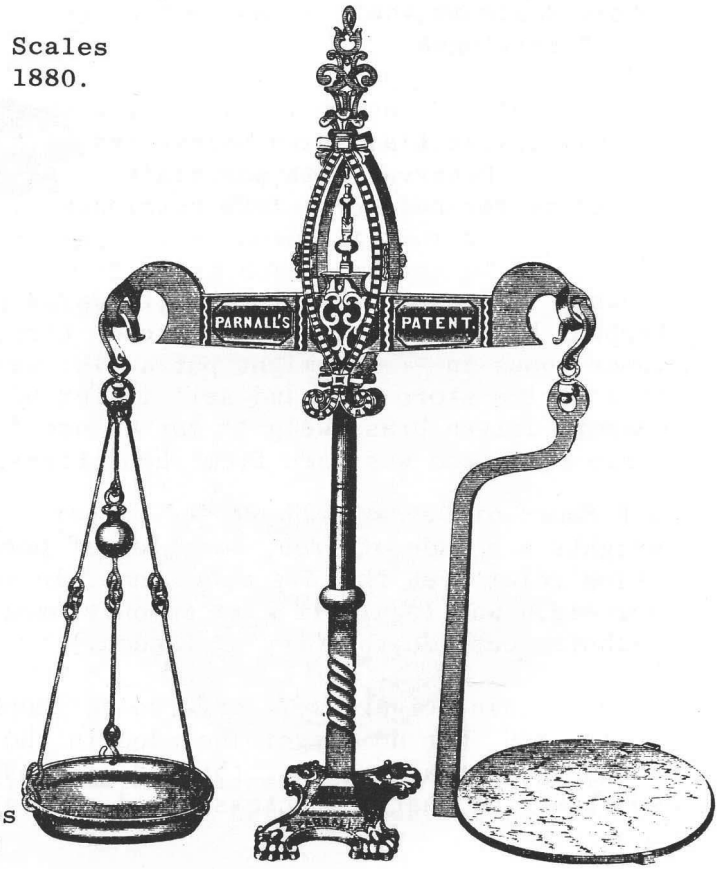


Fig.24 Parnall's Counter Stand Scales
Ornate top made of iron, 1889

Fig.25 Avery Ltd. Vibrating Inverted Roberval, marble pillars & china plate, 1909

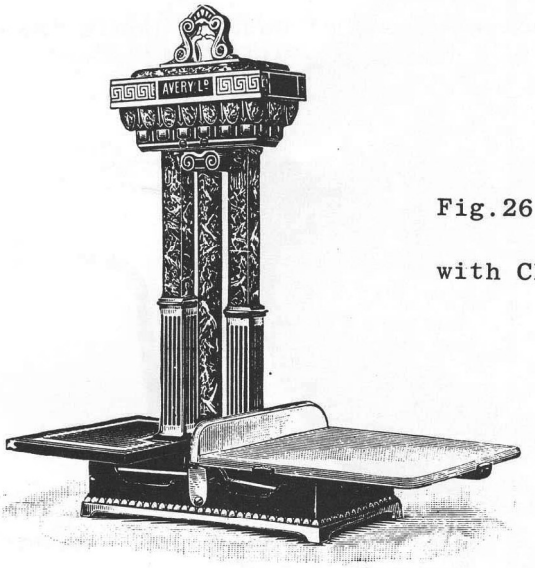
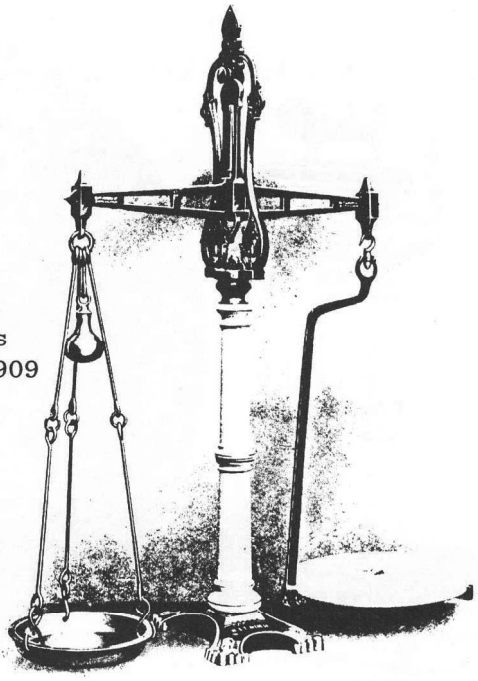


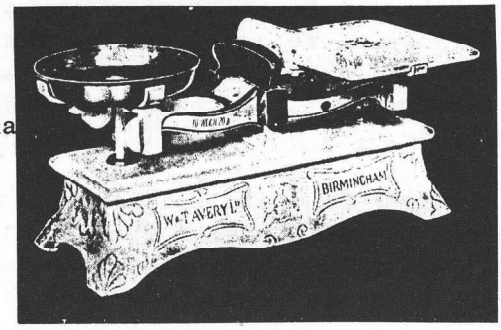
Fig.26 W & T Avery Stand Scales with China Stem, 1909



Porcelain plates were also offered with inverted Roberval scales, for weighing larger quantities of the same foodstuffs, Fig. 22, and for use with the pillar scales, called 'stand scales' in the catalogues, Fig. 23 and 24.

Porcelain covers were uncommon in England, although the Germans had many beautiful and fashionable top-pan household spring balances with porcelain covers. Avery's offered only one design in their catalogue for 1915-1916, the 'Avery China Box Scale', Fig. 27. The illustration is very faint, but one can just make out a very decorative hand-painted design on the white porcelain.

Fig.27 W & T Avery Ltd China Box Scale 80% dearer with china rather than oak. Catalogue for 1915-1916.



A porcelain pillar was offered on a few 'stand scales', either white or coloured and ornamented with gold bands, Fig. 26. A concealed iron rod took the weight of the beam and shears, as the porcelain 'pillar' was merely a decorative sleeve slotted over the iron rod.

Even more ornamental were the three porcelain pillars occasionally provided on inverted Roberval counter scales. Fig. 28, handsomely decorated with pink and gold pillars and a gilt bull or wheatsheaf on top of the central pillar. The bull was generally used by butchers and the wheatsheaf was used by grocers and bakers. If a matching set of pink and gold porcelain weights was used with the pink and gold scales, the shopkeeper must have been very shop-proud, considering that he could have bought an equally efficient inverted Roberval of equal ornateness, but made with marble pillars, for only half the price of his pink and gold confection. Fig. 25.

Fig.28 W & T Avery Ltd."Handsome Imperial Machine in Pink & Gold 1898

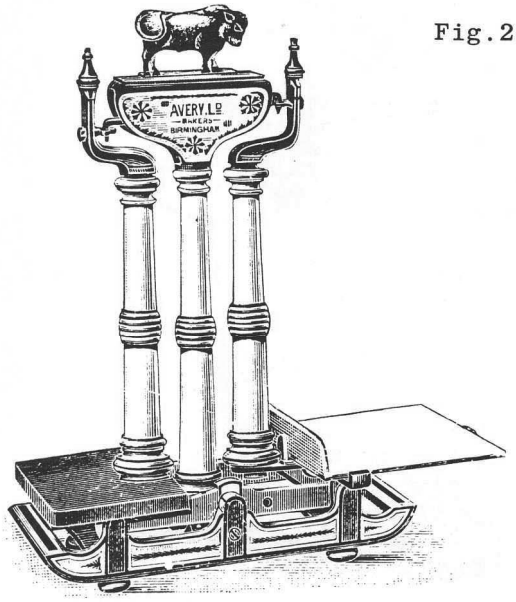
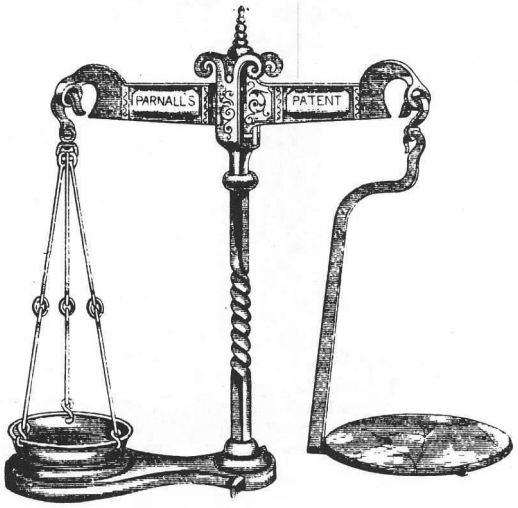


Fig.29 Parnall's Patent Grocers' Counter Scale 1889
Agate bearings like Day & Millwards'.



Continuing the thought of ornamental scales, S Mordan and Co. made one of their simpler Roberval postal scales with a porcelain base, made in the same shape as their mahogany bases, but of white china glazed with white slip and with a blue or maroon stripe round the edge, with a gold line each side. See page 939 of EQM for a good colour picture of these scales. As so few are in collections, we must presume that either few were sold, or that many were broken. More frequently we see the highly ornamented scales shown also on page 939 of EQM. Mordan's incredibly ornate brass Roberval Postal scales were gilded and set with porcelain plaques. Sometimes the plaques were a pair let into the letter and weight plates, showing two different but similar pictures such as two pretty ladies, two cherubs, two deer, two flowers, or two dogs. See page 940 of EQM. They were painted over the glaze in soft, pretty colours and lightly fired to make them durable.

Alternatively, Mordan's bought blue and white plaques from Wedgwood,(perhaps the most well-known of the Staffordshire potteries) the firm sending pairs of plaques with similar but different designs down to London to be incorporated into Mordan's scales. The base clay was always Jasper blue, with the design made separately out of white clay, and when both parts were 'leather-hard', the back of the white design was moistened and flicked delicately onto the middle of the blue plaque, before firing. The white designs were pressed in one of the hundreds of moulds, almost all depicting 'antique Greek scenes' of ladies in elegant robes dallying with scantily clad handsome youths, often watched by small boys. Mordan must have specified the size of his plaques to sixteenths of an inch, and ordered many diameters of round and oval plaques. On some of his biggest desk scales he used five or seven plaques, ornamenting the base and the A frame as well as the plates. As the brass was gilded on these high-quality scales, the whole effect was very rich. See page 681 of EQM.

However, decoration was rarely purely aesthetic on porcelain, as it was so obvious a means of advertising. A transfer print could be made for a retailer who was to

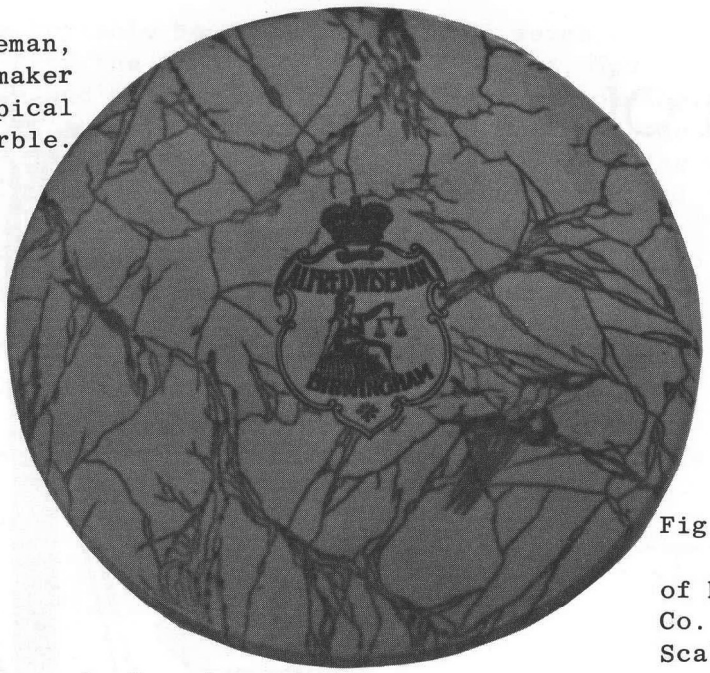


Fig.30 A Wiseman, Scalemaker Pre-1913. Typical imitation marble.

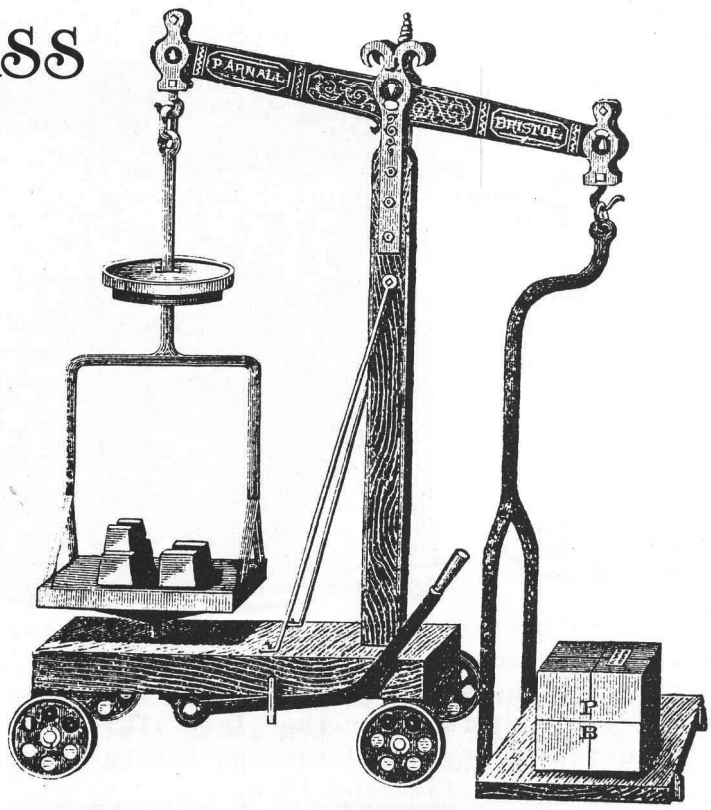
Below.
Fig.31 J Nesbitt proprietor of H Sutcliffe & Co. After 1913. Scalemakers.

use the scales, or made for the scalemaker himself, and it was no more work to apply the one than the other. Wedgwood and Copeland were two firms amongst many who supplied the scalemaking trade with servicable white pottery with blue or black transfer prints under the glaze. This article has a few of the more interesting transfers distributed through it, to show the range likely to be seen in food shops between 1840 and 1960.

The author thanks the many people who contributed material for this article, including W & T Avery, Salter's, Bob Roberts, Christies' Auction House, Utz Schmidt, Dick Chitty, White's of Auchtermuchty, Jerry Katz and Bill May.

A Touch of Class

BY JOHN KNIGHTS



This article is illustrated with scales made between 1889 and 1904, with the reference to their Class omitted. How many can you place correctly, after reading this article? Answers on page 1468.

Some religions see existence as a great wheel, (if this is so, mine is the one with the flat tyre.)

Whilst myself being unwilling to speculate upon the greater verities, it is certainly noticeable that many aspects of human creativity do seem to operate in a cyclical way, and we can often be surprised by something looming before us, which we fondly imagined had long since passed into history. One has only to to consider that ultimate triviality of man's endeavour, fashion in clothing. It is just about twenty years since I didn't wear flared trousers and now, I find I have to avoid wearing them again. If such an enormity can travel the great circle, then it would appear that nothing can be discounted.

During my several years involvement with legal metrology, in the United Kingdom, the notion of classes of equipment has been a minimal one. Under the Regulations of 1907 and their all too slavish successors of 1963, classification and restriction was applied only to the rarified area of beamscales and balances. It was not until the EEC Directive on Non-Automatic weighing machines was adopted, and then translated into UK law, that we saw the introduction of the OIML four class division of all types of equipment. Thus, we now have the classes I, II, III and IIII (not, it is emphasised, IV,) along with restriction upon their usage, especially in the case of the lowest category, in accordance with our E.C. responsibility.

Fig.1.Parnall's Portable Beam scale, 1901. To weigh 2-10 cwt. The side lever is constructed to keep the front board on the ground, and by relieving the weight from the centres and bearings whilst loading or unloading, admits of goods being trucked on or off the goods platform without removing the weights or requiring additional assistance, enabling one person to perform the work usually requiring two or three. For grocers, pork curers, cheesemongers and tea dealers.

Fig. 2. W & T Avery Jewellers' Scales in Oak Box, 1898. To weigh 1, 2, 4, 6, 8, 12, 16, 24 & 32 oz, with flat weights or cup, (nesting.)

Fig. 3. W & T Avery Letter Balance on Mahogany Slab, 1898. To weigh 4, 8, 16 or 32 oz. Beam graduated to any Standard.

Fig. 4. W & T Avery Dormant Platform Weighing Machine made entirely of iron, 1898. To weigh 20, 25, 30 or 50 cwt.

Fig.2.

Fig.3.

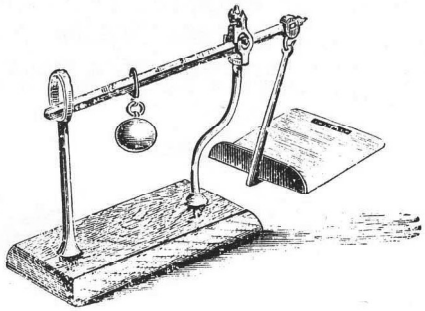
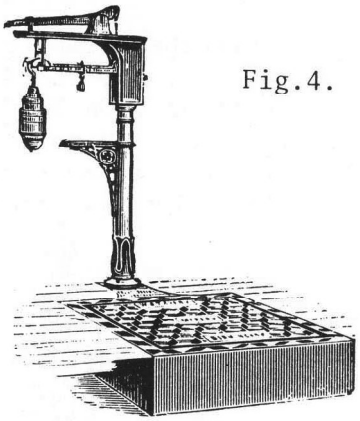


Fig.4.



In the UK, of course, and this is hopefully some justification for the somewhat devious preamble to this piece, we have seen it (or something very much like it) all before.

When I began to collect, in a modest way, items of weighing equipment, my knowledge of the legal controls that existed, prior to those of 1907, was limited to say the least. I did note, with some interest, that certain pieces of equipment, from a period clearly anteceding that date, did bear references to classes. It started with a chemical balance bearing a Victorian verification mark and the legend 'Class I' which indicated to my astute brain that some categorisation had taken place in this 'dark age.'

I eventually found out about the model Regulations of 1890 under which the first systematic weighing machine verification took place in this country and, some while later, obtained a copy,quoted in part on page 1459.

A study of this document gives an interesting insight into the metrological practices of late Victorian Britain, as well as an insight into the official mind as they sought to regulate the situation.

The first thing to note is that the legislation represented a comparatively light touch on the tiller as regards the enforcement of the official will. Rather than impose a rigid national framework of uniformity, the model Regulations sought to introduce controls with a recognition that local conditions

may have required an approach which differed from that perceived by the central bureaucracy. Thus, the Regulations were merely a model for adoption by such areas as wished to do so. The Act of 1889, which spawned them only required that Local Authorities make Regulations as to the verification of weighing equipment. Authorities could, in theory at least, have gone their own way without reference to the model. Any Regulations made for the purpose did have to be approved by the Board of Trade, however, so it is likely that the model was universally accepted or at least formed the major part of all local requirements.

As an example of this we see the Council of the Borough of Grimsby recording, in their agenda papers for 4th January 1892, that they should:
Affix the common seal of the Borough to the Regulations under the Weights and Measures Act 1889, recommended to be adopted by the Weights and Measures committee, with respect to inspectors and the inspection of weights and measures and weighing and measuring instruments in this Borough.

It is perhaps a little odd that it took this authority two years to accept the Regulations, but it is apparent that in previous years they had their minds on higher things. On July 31st 1890, for example, the Council had to:
Consider and, if so determined, to adopt the report of the Weights and Measures committee recommending the purchase of a hand cart. These were truly the times for momentous decisions!

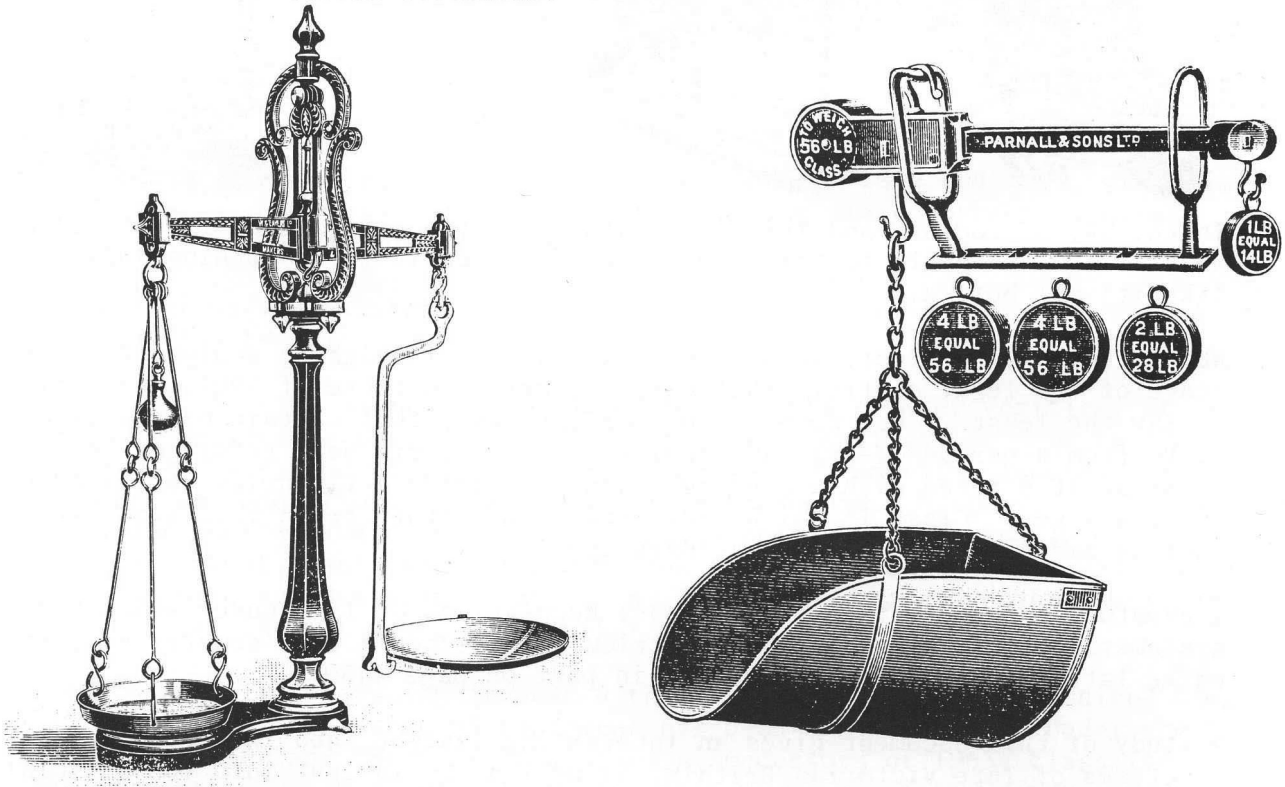


Fig. 5. W & T Avery Agate Scales for Shopkeepers & General Purposes, 1898. To weigh 7-50 lbs. with 16 to 30 inch beam.

Fig. 6. Parnall's Coal Scales, registered design no. 329723, to meet regulations for sale of coal under the 1889 Act, 1901. Adjusts itself to any incline, supplied with small weights for taring bags or baskets up to 7 lbs. To weigh half or 1 cwt.

All scale-beams, counter weighing-machines, spring-balances, and steelyards for weighing under 2 cwt. should indicate to and should turn accurately with the following amounts, when they are presented for verification and stamping:-

CLASS I

Maximum Load of the Weighing Instrument	Scale-beams and Balances	Counter Weighing Machines Spring-balances, and Steelyards
2 cwt	½ ounce	1 ounce
1 cwt	4 drams	8 drams
56 lbs	2 drams	4 drams
14 lbs	1 dram	2 drams
7 lbs	20 grains	1 dram
4 lbs	5 grains	20 grains
1 lbs	2 grains	10 grains
1 oz	1 grain	5 grains

All instruments as above should be marked 'Class I'

CLASS II

Weighing instruments such as those used for weighing bread and meat.
These instruments should turn at least with four times the amount allowed in Class I, and should be stamped 'Class II' when submitted for stamping.

CLASS III

Weighing instruments such as those used by itinerant vendors, or for weighing coal, vegetables, wood and metals.
These instruments should turn at least with six times the amount shown in Class I, and should be stamped 'Class III' when submitted for stamping.

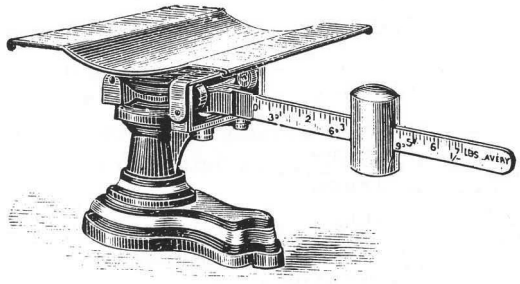
Given that the model was adopted widely, the Regulations themselves bestowed a measure of discretion, with phrases such as:
Except as otherwise provided, a local authority may allow on weighing machines in use in their district such amount of error as they may approve' appearing throughout.

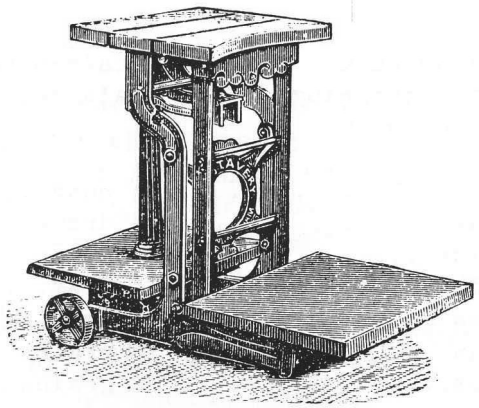
The value of the document as a catalogue of equipment then in common use, is enhanced by the fact that categories are not only named but described in some detail and profusely illustrated. Thus, we see equipment divided into the broad categories of 'large weighing machines' and 'scale beams and portable weighing instruments.'

The 'large' category includes descriptions and illustrations of platform machines with steelyards and dials, weighbridges up to 100 ton capacity, other forms of compound lever machine, such as crane machines, and automatic weighing machines.

Fig. 7.W & T Avery Lever Parcel Scale with Copper scale & Brass Steelyard graduated by one ounce divisions, 1898. To weigh 7 or 11 lbs.

Fig. 8.W & T Avery Strong Portable machine for weighing Sacks, Bales & General Goods, 1898. Frame, beam etc. made of cast-iron. Wood or iron plates, fitted with handles and wheels. To weigh 4 to 12 cwt.





The 'portable equipment' described and shown is even more interesting for the type and variety revealed. In addition to the scale beams, spring balances, dead weight and counter machines of familiar form, we see some examples of counter steelyards whose use in the UK (even restricted to 'manufacturing use only') was largely unsuspected by me.

All the portable equipment, as previously described, was required to fall within one of the three classes, based on their ability to 'indicate to' and 'turn accurately to' certain amounts tabulated in the Regulations.

Scale beams were given their own set of tolerances and another list was given for counter weighing machines, spring balances and steelyards.

Class I machines were the most accurate and sensitive with, for example, a one hundred weight machine being allowed 8 drams. Class II machines were those used for weighing commodities like bread and meat and had a tolerance four times greater than those for the top class. Class III was for machines used to weigh coal, vegetables, wood, metals, etc., especially as used by 'itinerant vendors'. This type of machine had tolerances six times greater than those of Class I.

These would have been difficult times for both traders and inspectors as they all attempted to adapt to these new regulations. Inspectors would have been faced with the task of testing and either verifying or refusing, large numbers of scales; traders would have been less than happy at having their weighing machines submitted to this detailed scrutiny. It is likely that in many areas especially the more rural parts of the country, equipment would have been accepted and stamped which was not altogether in accordance with the principles set out in the legislation, either because of uncertainty on the part of the inspector or his unwillingness to create too many waves within his community.

Evidence of this is found, to this day, in the form of odd pieces of equipment, especially spring balances, which have been stamped in clear violation of the model requirements.

I have examples of pocket spring balances of 30, 40 and 60lb. capacity, which have all been stamped despite the lack of any class marking and the 8 oz. and 1lb minor divisions on the slides.

Strangely enough, the class marking was extended to examples of large weighing machines such as platform machines and weighbridges, which were not even subject to classification and for which only one set of tolerances was listed in the Regulations. It is difficult to understand the significance of the class markings in these cases and it is perhaps just another manifestation of the uncertain situation caused by this new legislation.

The Regulations, made under the Act of 1889, were superseded in 1907 by a new set which applied nationally and thus did away with the discretionary element in the acceptance of the equipment. The application of a class system was now restricted to the specialised area of beams and balances.

By way of a postscript, it is worthy of note that the later Regulations also removed certain traditional types of machine from the list of acceptable equipment. Thus, 1907 saw the end of the accelerating counter machine and eventually the demise of the 'turnover' pattern of steelyard as well as those small capacity counter steelyards alluded to earlier.

Nowadays, under the aforesaid EEC Directive, certain simple types of equipment can now be accepted community-wide. Among these are steelyards of capacities either above or below 30 kg. and with either single or double graduations.

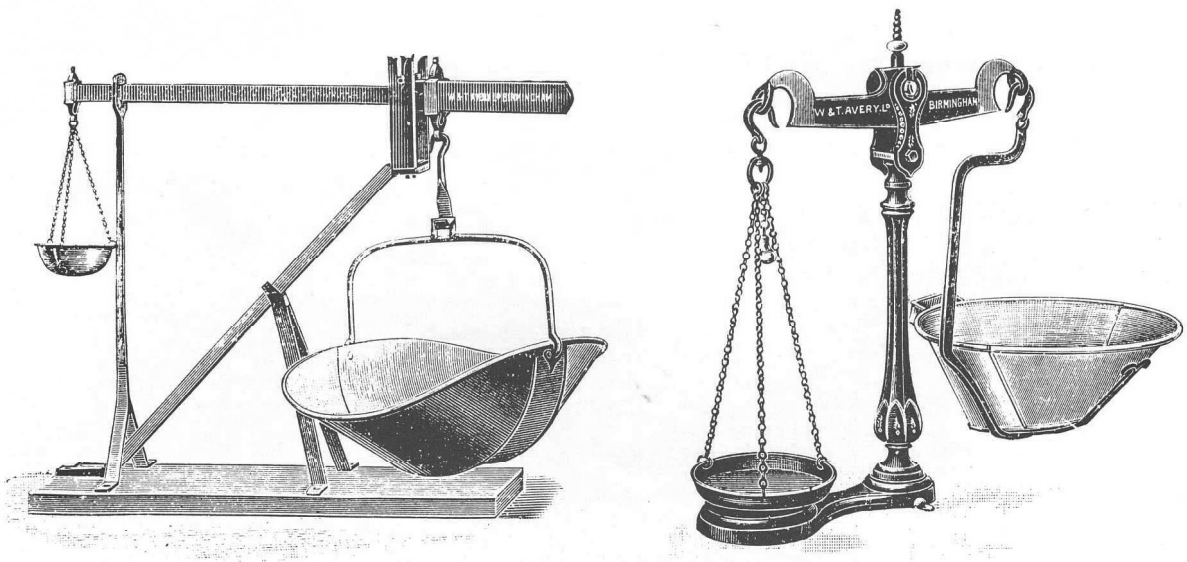


Fig.9... W & T Avery Computing Balance, power 10 or 12 to 1, with elm slab, agate bearings and boat shaped scoop, so arranged that either a dozen articles in the small scale represent a gross (144) in the large one, or ten in the small pan equal 100 in the large pan. Galvanised or copper scoop. To weigh 10-30 lbs.

Fig.10. W & T Avery Stand Scales fitted with a scuttle-shaped Tin Scoop, one peck size, to weigh 20 lbs, 1898.

Therefore, we again see the theoretical usage, within this country of both small capacity steelyards and a type of machine which sounds suspiciously like a turnover steelyard, both of which we thought had long disappeared.

Did anyone get the number of that cycle?

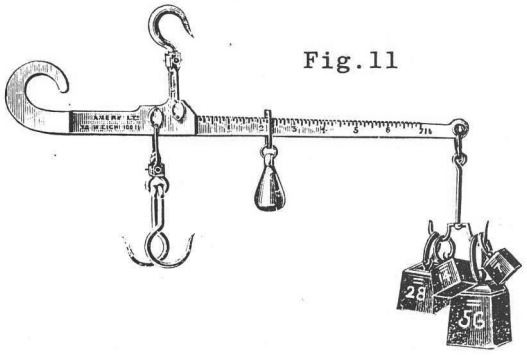


Fig.11

Fig. 11. W & T Avery Butchers' Balance Steelyard made of wrought iron 1898. To weigh 100-300 lbs.

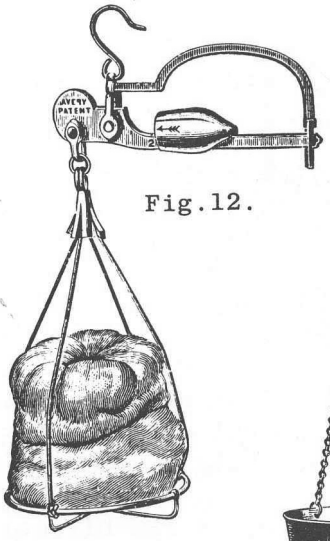


Fig.12.

Fig 12. W & T Avery's Patent Bakers' Steelyard for use in carts, 1898. Supplied japanned, polished or brass. To weigh 2 or 4 lbs.

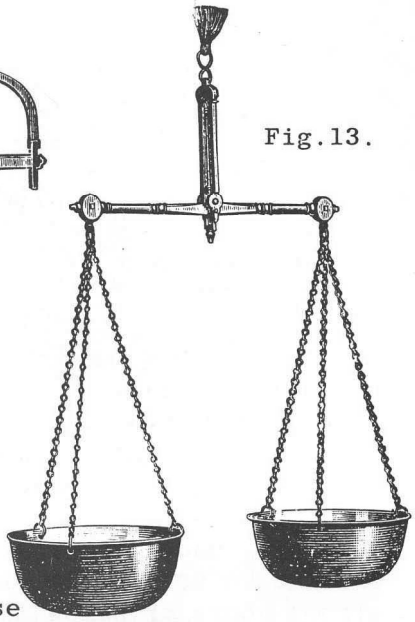


Fig.13.

Fig. 13. W & T Avery Tea scales, brass or iron beam, copper pans. 1898. Pan diameter $4\frac{1}{2}$ to 7 inches.

SHOWCASE

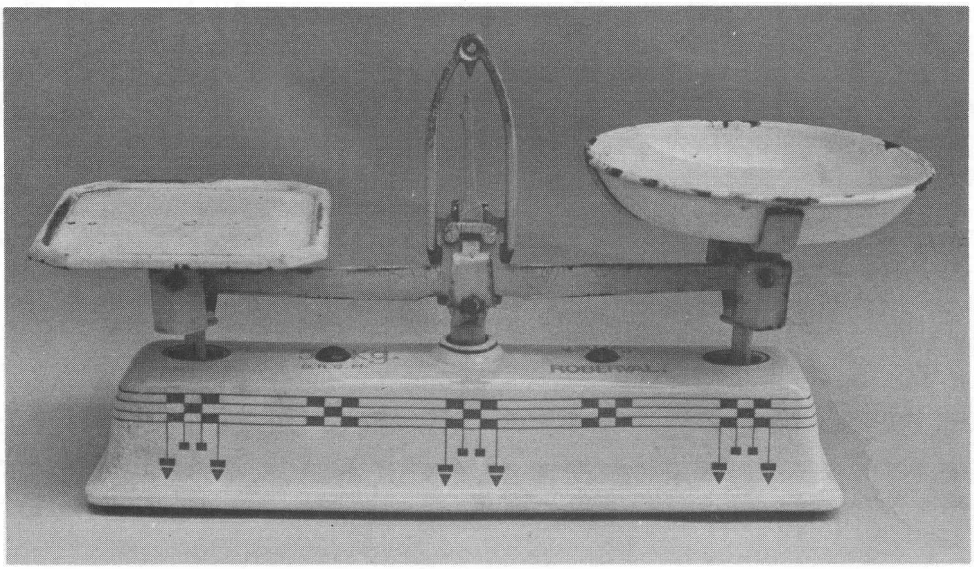
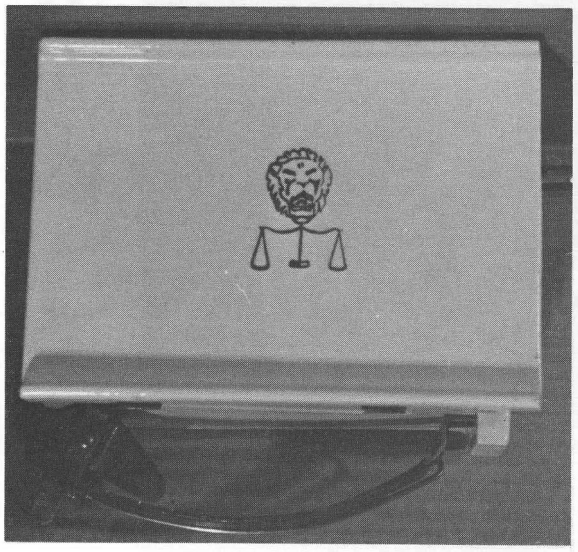


Fig.1.



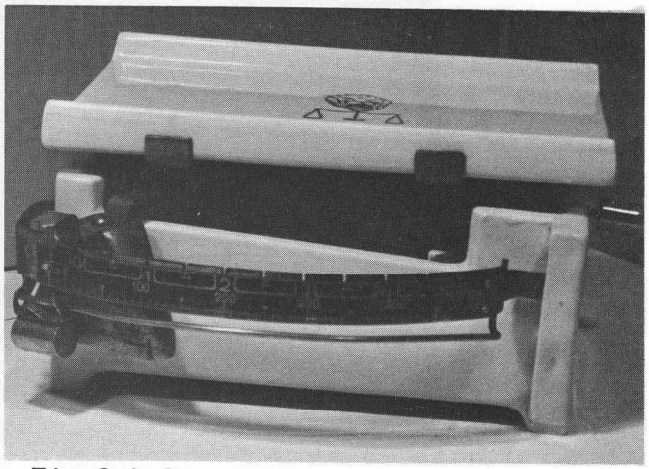


Fig.2 & 3.

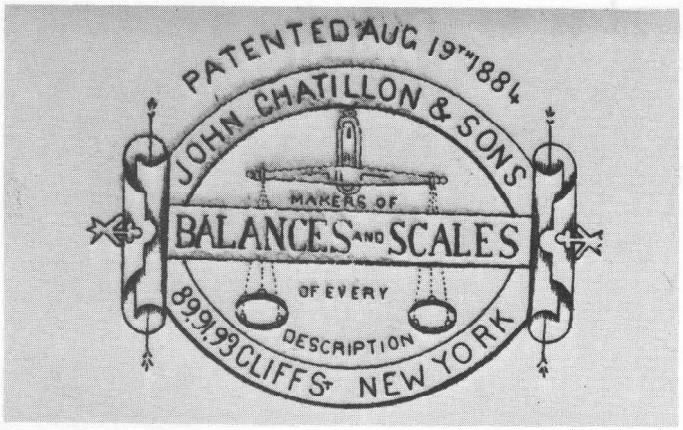
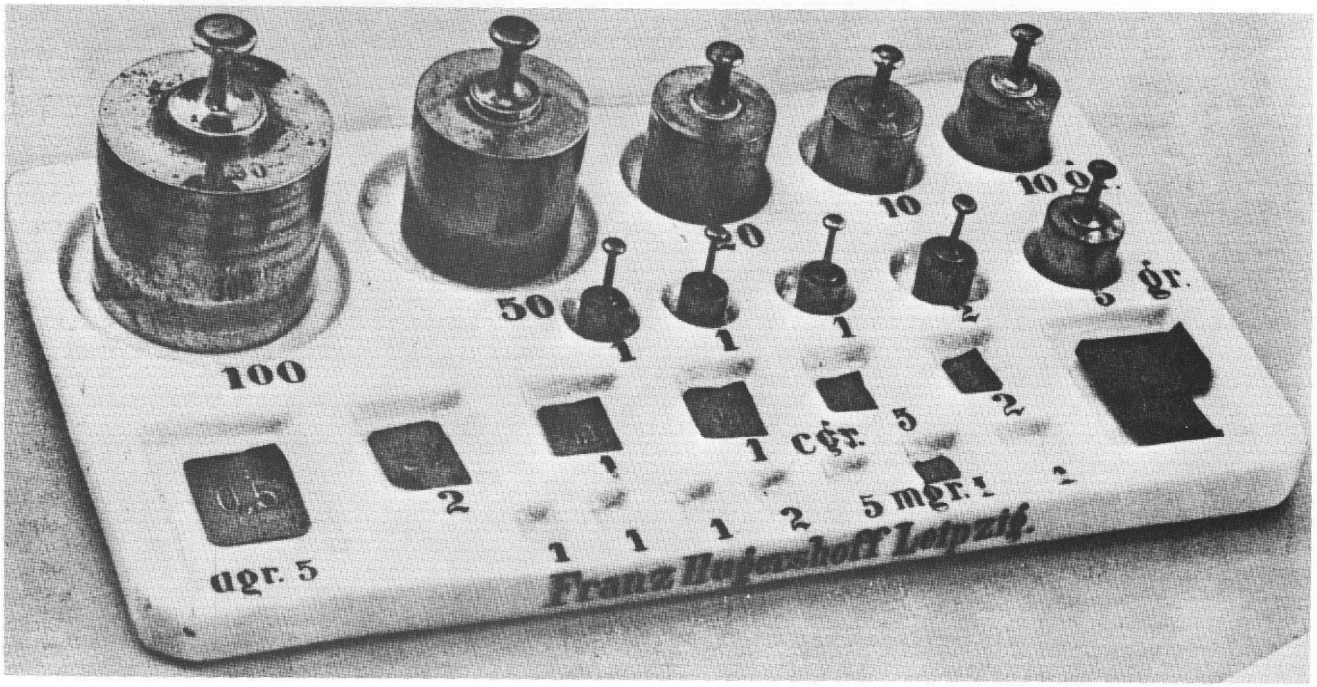

PATENTED AUG 19TH 1884
JOHN CHATILLON & SONS
MAKERS OF
BALANCES AND SCALES
OF EVERY
DESCRIPTION
89 91 93 CLIFF ST NEW YORK

Fig.5.


100
50
20
10
10 gr.
5 gr.
2
1
1 Cgr.
5
2
2
dgr. 5
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5 mgr.
1
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Franz Hugershoff Leipzig

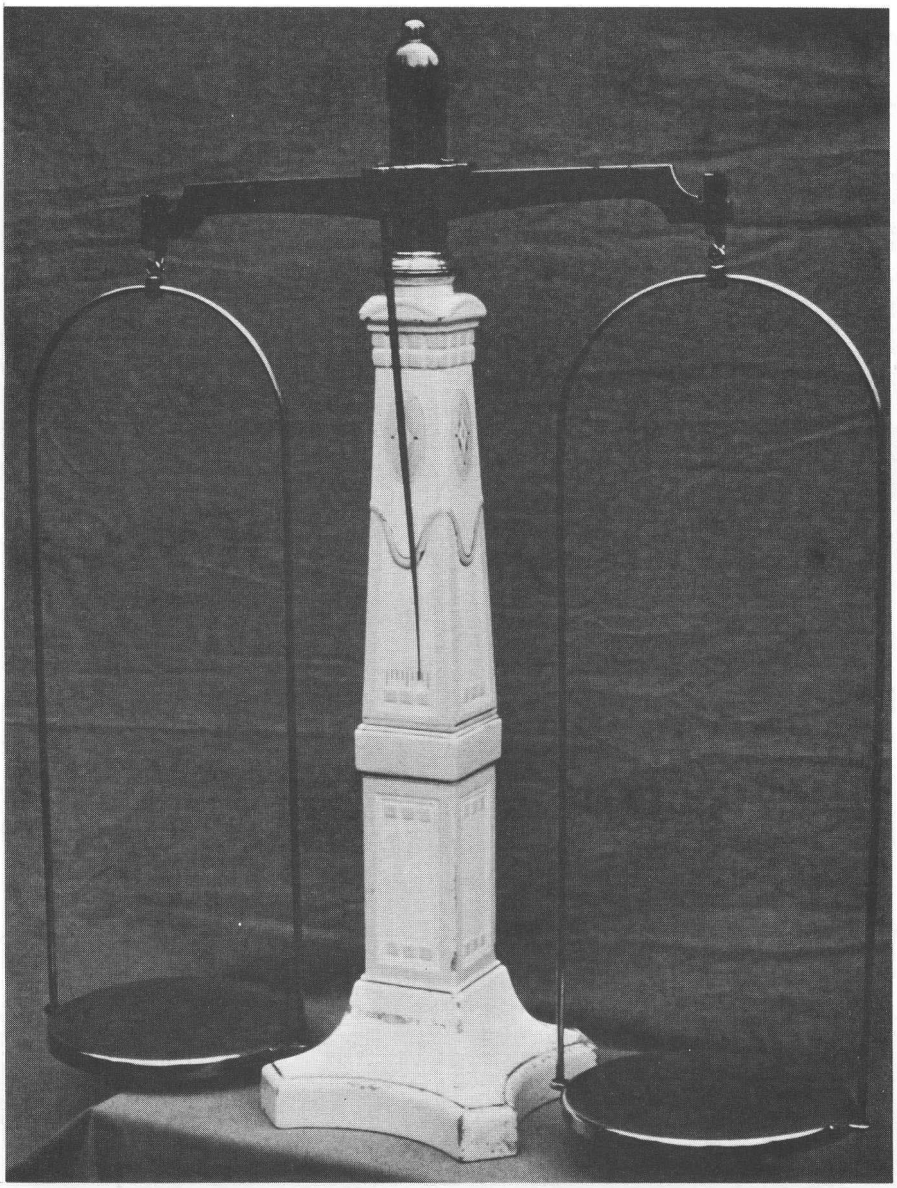


Fig.1. Krups 5 kg. Kitchen Roberval scale with blue Art-deco decoration c.1930
Interesting to see the principle on which it works printed on the scale.
EMIL COHN COLLECTION

Fig.2 & 3. Swedish Kitchen Steelyard for 5 kg. with porcelain cover & plate
JOHN KNIGHTS & BERNARD GOODWIN COLLECTIONS

Fig.4.Scale plate transfer. John Chatillon & Sons. 1884.
CARL BENDER COLLECTION

Fig.5. Porcelain Weight Holder by Franz Hugershoff, Leipzig, Circa 1850.
Highly sought-after item in Auktionhaus Wendt, Katalog XIV, Nov. 1976

Fig.6. German stand scale with a porcelain pillar, decorated in pale blue and gold lines.
DIRK SCHMITZ COLLECTION

Michael's Thoughts

Springs

BY MICHAEL CRAWFORTH

This is the beginning of an article being prepared by Michael, which was unfinished at his death. Because it is interesting, I publish it in its incomplete form, with apologies to those of you who wish to know more.

Few weighing devices are taken for granted as much as the humble spring balance, that every-day work-horse which weighs reliably and uncomplainingly, in all sizes, from a few ounces up to several tons. Its invention is relatively recent, yet very little is known about the origins, and much historical research remains to be done. Haeberle supposes the first use of springs for weighing to have been at the time of Huygen's development of springs for clocks in the 1670s. Burstall refers to a description of spring balances in Hooke's note books, and illustrates two drawings of 1694. Christoff Weigel, writing in 1698, describes a 'newly invented' scale working 'without pans or weights, by a wire spring.' Later references are Bion's 'peson à ressort' of 1709, and the illustration of a spring balance by Leupold in 1738. So, it would appear that the first use of springs for weighing occured in the late 1600s, when manufacturing techniques were adequate for producing reliable springy metal.

The composition of those early springs is not known, but in the early 20th century, scale springs were commonly made from annealed steel wire with a high carbon content, (carbon 0.85 to 1%, manganese 0.3 to 0.45% and silicon 0.1 to 0.2%) The wire for coil springs was drawn from annealed rods and heat-treated, after forming, to harden and temper the metal.

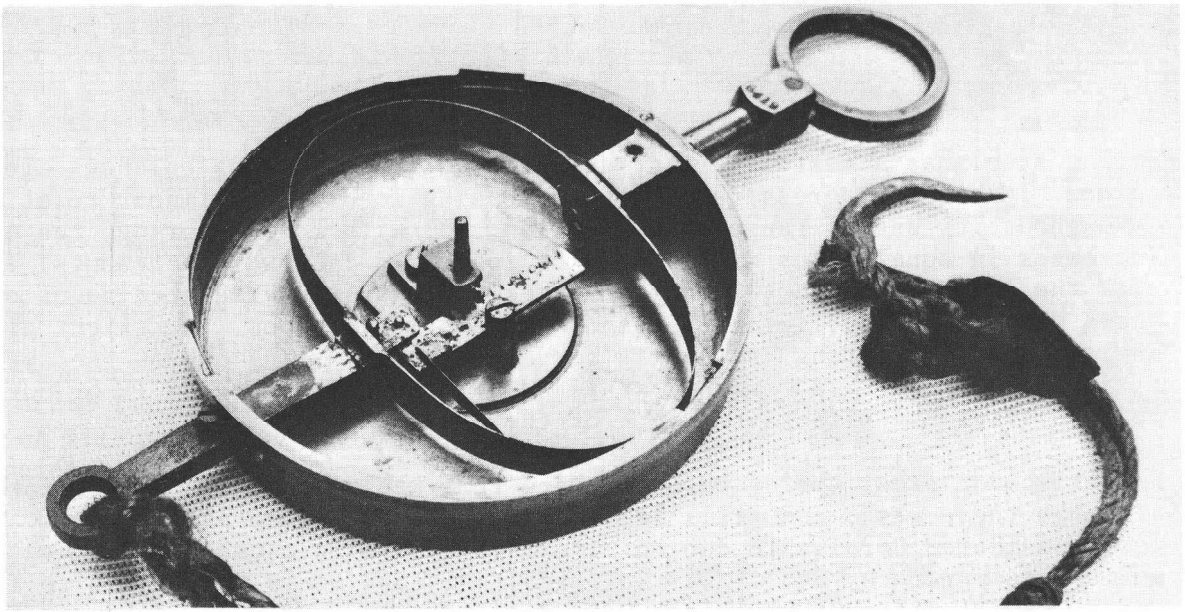
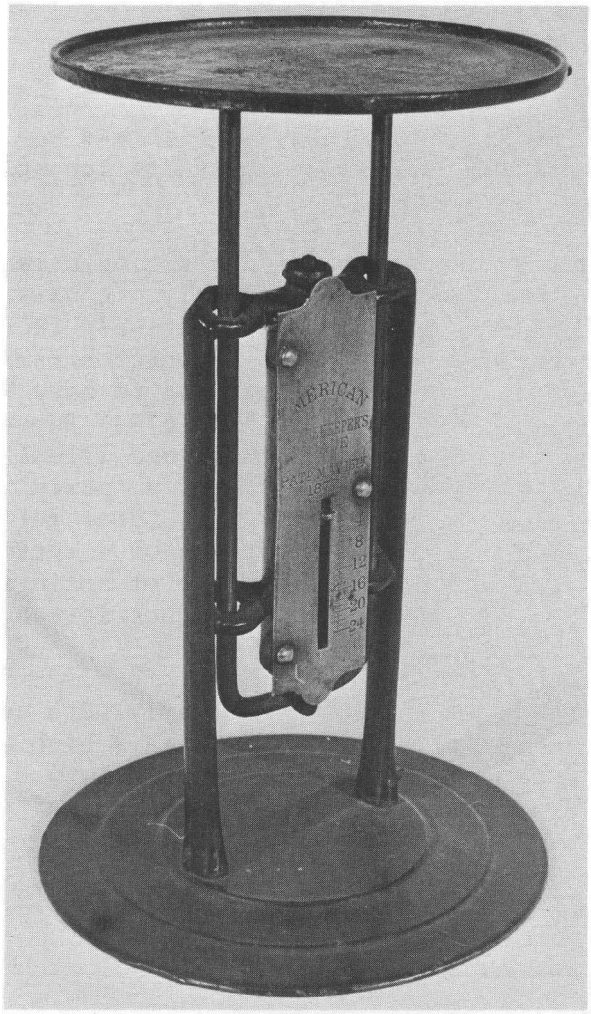
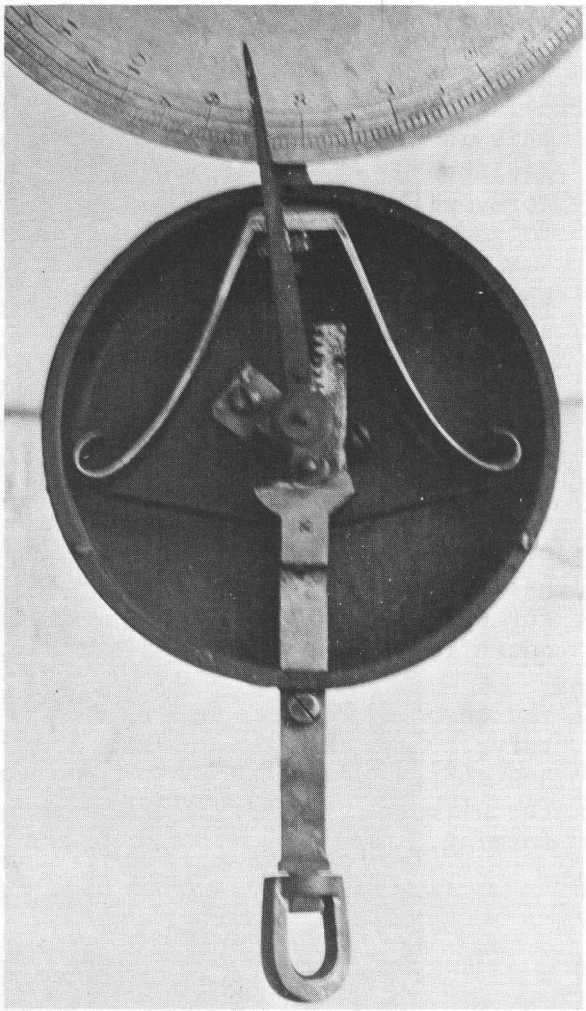


Fig.1. H Marriott spring balance, serial number 6419. Finished work in 1848.

Fig.2. American Housekeepers Scale, patented May 15th, 1877. The friction of these guides was very severe, making it most unreliable.

Fig.3. Lyre-spring balance, made to the design patented by A Siebe 5th April, 1819. H Marriott made balances to this design.





Spring steel has a most important characteristic, as far as balances are concerned. It bends progressively with increasing loads, in a linear relationship, throughout its useful range of deflection. So, with a coil spring, the extension increases in equal steps if the load is increased in equal increments. Thus, with the careful manufacture of identical springs, the graduated faces of balances can all be made identical, and with equal divisions. Any slight discrepancies in manufacturing are easily corrected by adjusting one of the spring fixing points. This is commonly achieved by winding the fixing in or out of the coil to alter the effective length of the spring.

Properly made steel spring balances were remarkably consistent in performance, although there was , and still is, considerable prejudice against them. They were considered unreliable due to alterations in size caused by changes in the ambient temperature, and it was believed that they would be subject to fatigue and permanent distortion. These views were largely unfounded. A temperature change of 50° C, a substantial change in weather, would cause an error of

about 0.02% in a scale with an uncompensated spring. In practice, even many simple, straight-faced spring balances have had automatic compensation for this minute error, since around the mid-1800s. The tongue, a metal strip carrying the pointer, ran parallel to the coil spring, so that any change in spring length, due to temperature, was equalised by the tongue which changed length in the opposite direction. Similar compensation occurred in dial-faced balances due to expansion of the rack being opposed to the expansion of the springs.

Fatigue is most unlikely to occur in a properly designed and well-made spring balance, used well within its capacity. Springs have an enormously long life;- consider the springs on car exhaust valves, which operate about a hundred thousand times, in high temperatures, for every hour of driving!

Springs can be permanently distorted by overloading, but all danger of this is eliminated in the design of balances by limiting the extension of the spring to a safe amount, usually within the confines of the case.

Criticism of the spring balance has also been raised because of the effects of gravity at different altitudes. A spring balance which has been calibrated at sea level, by reference to standard weights, would show errors in the indicated weight if it was taken to the top of Mount Everest where the reduced gravitational force would render a load lighter than at sea level. (Such an error cannot occur with an equal-arm balance because the weight of the weights would be affected by gravity in exactly the same way as the load.) However, the error caused by this change of altitude is very small, 0.25%, and it must be remembered that spring balances are not intended to be precision instruments, as used for weighing in laboratories. In any case, balances which are intended for permanent use at high altitudes can be correctly calibrated by the manufacturer.

The chief source of error in spring balances is not due to the spring itself, but is caused by friction in the indicating mechanism. When a coil spring is extended by the load being weighed, the coils tend to unwind slightly, causing the pointer to rub on the side of its slot. On balances with short springs, used for general purpose weighing of a non-critical nature, this friction is acceptable. However, for balances with very long springs, intended for more accurate weighing, the lower half of the spring is coiled in the opposite direction to the upper half. Thus, the tendency to unwind clockwise at the top is counteracted by an equal tendency to unwind anticlockwise at the bottom, and the pointer moves freely in its slot.

Dial-face spring balances suffer from friction between the teeth of the rack and pinion, and in the bearing of the pointer. Similarly, the pointer of the mancur balance, the linkages of a half-Roberval balance, and the indicators of most other types incur frictional errors. The only exception is a little-used type of flexure spring balance, on which the free end of the flat spring is the pointer.

Thanks are due to Horst Winkowsky, the Avery Historical Museum and to Bill Doniger, for the use of photographs of their scales.

Recognition & Money!

PAUL BUNGE PRIZE

The Jenemann-Mettler Foundation announces the inception of the Paul Bunge Prize, a monetary prize to be awarded annually (from 1992 onwards,) for a piece of work in English, German or French, concerned with the history of scientific instruments, including balances, irrespective of whether it has been published or printed previously, as long as it was not published more than three years before being submitted for consideration. The prize will be awarded irrespective of the age and nationality of the author submitting the work, and may consist of one item or several items combined. This will allow work of an instrument historian carried out over a lengthy period of time to be honoured by the foundation, as it is the last part of those offered that must have been finished within the last three years before the submission date, and the rest completed within the last ten years.

The foundation is endowed with 10,000 marks annually, and has been established by the initiative of the Mainz balance historian, ISASC member and contributor to EQM, Hans R Jenemann, with Mettler Instrumente GmbH of Giessen. The foundation is to be administered by the Founders Association of German Science in Essen.

The prize is named after Paul Bunge, 1839-1888, who worked on the development and construction of analytical, assay and high-performance precision balances. As early as 1867 he produced the first short-arm analytical balance, which was adopted unchanged by other workshops. The 'micro-balance' was based on one of Bunge's developments. In 1880 Bunge constructed a two-knife substitution balance. making him the forerunner of Erhard Mettler, who promoted the acceptance of the substitution principle in laboratories in the 1950s.

Details can be requested from the Founders 'Association of German Science, at Brucker Holt 56-60, D-4300 Essen 1, from Dr. Klaus Neuhoff, quoting the reference 'Paul Bunge Prize.'

EDITOR'S ERROR — CORRECTED BY LUCIO MARSON

On Page 1420 there was a paper by G. Zavattoni, on an interesting Italian coin scale which I admired. The weight missed out by the editor is, in my estimation, '9. Un quarto di Dop. di Sp^{a}.' (probably of Carlini 4.50 in accordance with 2.25 for an ottava, number 17, or Carlini 4.62, in accordance with 9.25 for mezza dop^{a}., number 5.)

Answers..Fig 1..Class II
Fig.2..No class, illegal for trade.
Fig.3..Class I
Fig.4..Class II
Fig.5..Class I
Fig.6..Class III
Fig.7..Class III
Fig.8..Class II
Fig.9..Class I
Fig.10.No class, manufacturing only
Fig.11.Class III
Fig.12.Class II
Fig.13.Class I

ISASC

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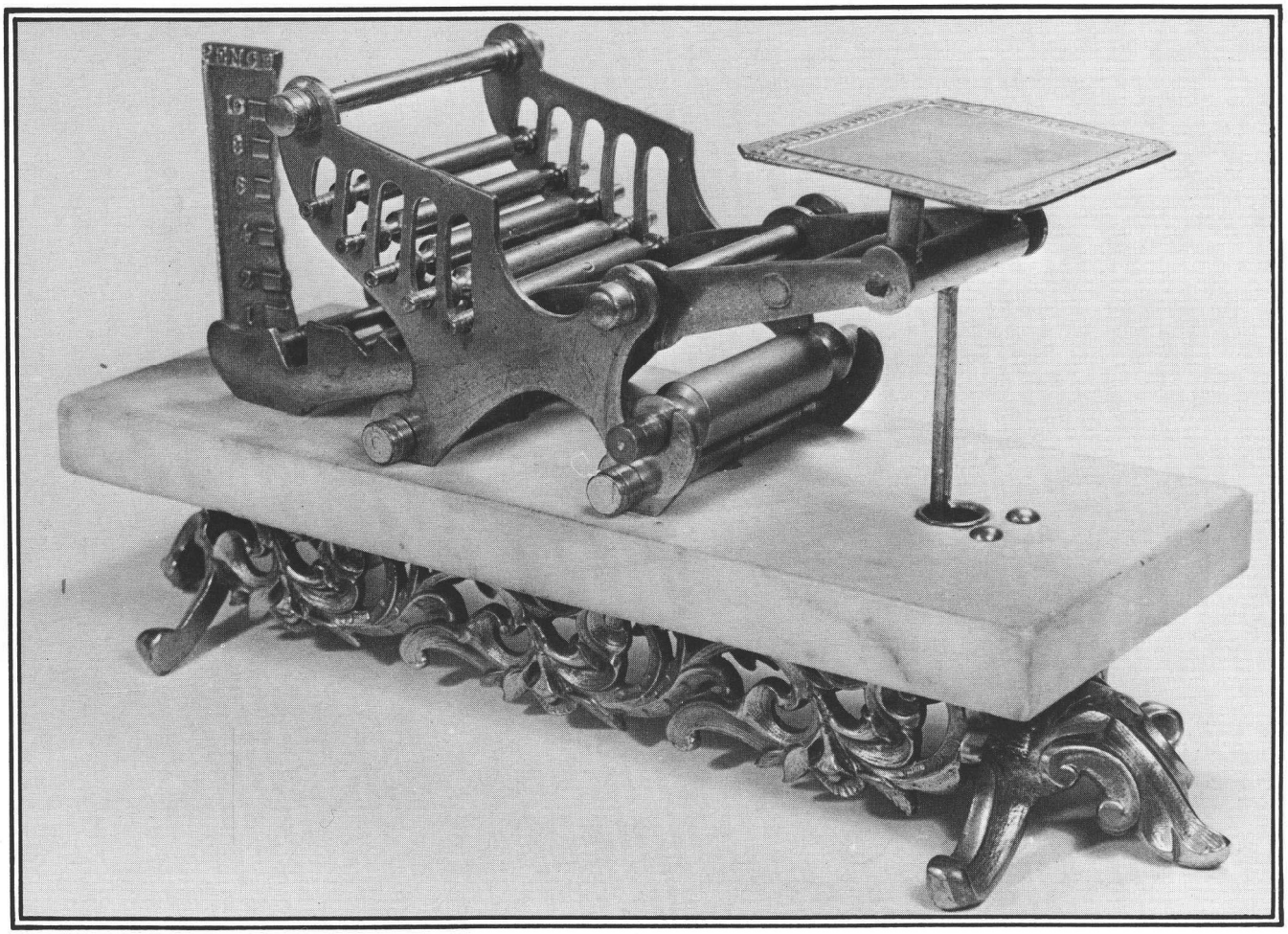
PAGES 1469-1496



PAGE 1470

Cover Picture

English Postal Scales, Patent no. 8384, taken out by R Willis, inventor, in 1840. Made by J & E Ratcliff (see p.1479-89) in three sizes, 3, 5 and 9 rolling pins, with a large pin stored under the central pivot, to increase the capacity.

Stamping Coin-Weights 1699

FROM GENE MAHONEY

THE LAW FOR APPOINTING AN OFFICER TO RECTIFIE AND STAMP MONEY WEIGHTS, 10 MAY 1699

Whereas there is a General Complaint among the Inhabitants of this Province and Territories for want of a Standard for Money Weights. Be it Enacted by the Authority aforesaid, that no person within this Government from and after ye 24th day of ye 7th month next shall be obliged to receive or take anie Money by anie Weights which are not of brass regulated and stampt by the Person that is now, or shall be hereafter appointed for that purpose. Which said Officer shall keep in his Possession att all times a true Standard of brass Troy Weights, according to the King's Standard of England, by which hee shall trulie and exactly regulate all Persons' Weights that shall be brought to him, and stamp the same with his Stamp; for the doing of which Hee shall have one Pennie for everie Weight so stampt and rectified.

Which said Officer shall have power once in 3 years to call anie Persons' Weights to a new Trial and stamp if occasion be. And for the more speedy putting this Law in execution Itt shall and may be Lawfull for Thomas Paschal, Senior of Philadelphia to execute ye same as long as the Governour & Council shall see meet. And in case of Death or other occasions the Governour & Council shall have power to nominate and appoint anie other Person in his room. And whereas difference hath arisen about ye goodness & exactness of Scales. It shall be Lawful for the Receivers of Money to choose which end of the Beam hee shall have the Money weighed on, if the payer be owner of the Scales. And if the Money turn the Scale, Itt shall be accompted passable.

Source;- Province of Pennsylvania Laws, Passed between the years 1682 and 1700. Harrisburg PA, Lane S Hart, State Printer 1879. Pages 287-288.

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Hallmarks on Base Metal

BY BENDE & PAUL WITHERS

THE USE OF THE HALL MARK AS A STAMP ON BASE METAL MONEY WEIGHTS

Collectors of coin-weights have long been familiar with the anchor counterstamp on coin-weights of the mid 1770s period, Fig.1. Whilst numismatists and collectors have accepted the mark almost without thought, which says something for the acceptability and power of the mark, there was no evidence that the mark had been applied by the Birmingham Assay Office. Questions to the contemporary Assay Offices on the subject were met with shock, horror and dismay. The official line is that brass is a base metal and that hall marks are only applied to precious metals.

Whilst researching in preparation for a catalogue of British Coin-weights, we accumulated substantial circumstantial evidence that the mark is what it appears to be, ie. it was applied by the Birmingham Assay Office, (except, of course, when counterfeited.) Furthermore, it appears to be part of an established tradition going back to the 1680s and perhaps even further back. Indeed, Mr. Johnson, the Assay Master at Sheffield, is of the opinion that, in the past, Assay Masters have served, in some respects, as the forerunners of present day Standards and Weights and Measures Departments. (1).

A Proclamation in 1680 by the Lord Mayor of the City of Dublin listed the Standards relating to foreign money circulating, but he bemoaned '....*great disturbance, trouble and loss doth arise to his Majesty's good people, and for that it is notorious that most weights used for the said coins do exceed the standard by several grains.*'

Fig. 2

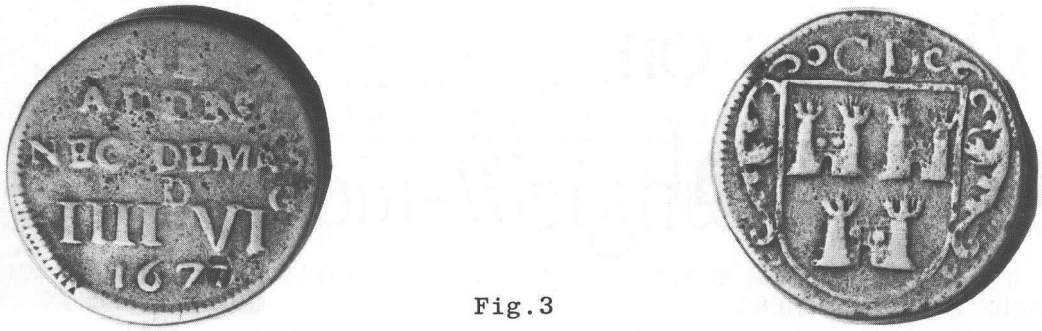


Fig.3

The proclamation continues *'These are therefore to give notice to all persons within this City, the franchises and Liberties thereof, that do keep and use any weights for the foresaid occasions, that I have authorized and appointed Richard Lord of Copper Alley, in the City of Dublin aforesaid, Goldsmith and sworn Assaymaster, to make and have in readiness for all such persons as will try the same exact weghts for the several coins according to the said Acts of State: hereby requiring the said Richard Lord that he suffer none of the said weights to pass out of his hands without first bringing them and every one of them to the exact Standard according to the said Acts of State, and do seal and impress them with the arms of the city of Dublin and mottoes like unto those he has already left with me, which shall remain in the New Hall of the said City, to compare all others his weights by.'*

From this, one might assume reasonably that Richard Lord was a manufacturer of weights. However, investigation of the records reveals that, as stated in the proclamation, Richard Lord was a goldsmith, freed from his apprenticeship in 1657. Certainly from the date of the proclamation, and perhaps for some time before that, until his death in 1692, he was the Assay Master for Dublin.

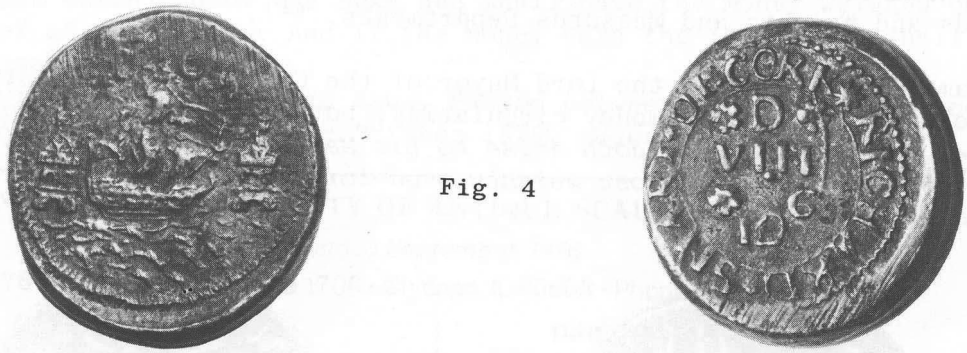


Fig. 4

His appointment as maker and examiner of money weights made sense. He was already in possession of accurate weights and the technology for measuring small quantities, obvious prerequisites. He was both literate and numerate, and he had experience of checking standards through assaying silverware. To check accurately the mass of weights would have been no problem. Furthermore, it would generate income for him.

Although not stated so in the proclamation, his weights would probably have been made by either a brazier or a founder; guild practice and trade etiquette of the time lead us to expect a division of labour.

It was not recorded whether a brass caster worked with Richard Lord, though it is significant that when John Cuthbert took on the job of manufacturing the gold and silver money weights after Lord, a founder, Henry Paris, was also specified in the proclamation.

The weights made by Richard Lord, Fig.2, were for the Spanish silver dollar, half and quarter dollar; coins which were accepted international trading coins of the time, Ireland having no silver coinage of its own. The weights were indeed stamped with the arms of the city of Dublin and were undoubtedly those to which the proclamation referred. They were, however, dated 1670, a date which was prior to that of the proclamation by some ten years. There was a further issue in 1677, Fig.3, of the half dollar, if not the others, when one of the dies for striking the weight was altered to read 1677 instead of 1670.

Fig. 5

The proclamation may therefore have been made to regularise a situation which had already prevailed for ten years; or it might have been an Act of State authorising the monopoly in order to establish and ensure a single accurate standard, or both.

There were also weights struck in the city of Cork by the goldsmith, and sworn Assay Master, Richard Smart. These bore the arms of the City of Cork, Fig.4. Although no proclamation is known, it is likely that one was made. What is interesting, however, and germane to the argument, is that his touchmark was applied to a coin-weight which may or may not have been issued by him. (Incidentally, the statement made by Westropp (2) that these Cork weights were dated 1679, is an error. I have examined the weights, undoubtedly those known to Westropp, and there is no date visible on them.)

Ireland in the 1680s is a far cry from Birmingham almost a century later in the mid-1770s. However, examination of a private collection recently, brought to the fore a weight which I knew existed, but had not previously seen, Fig.6. It follows in the established traditions mentioned above in several respects.

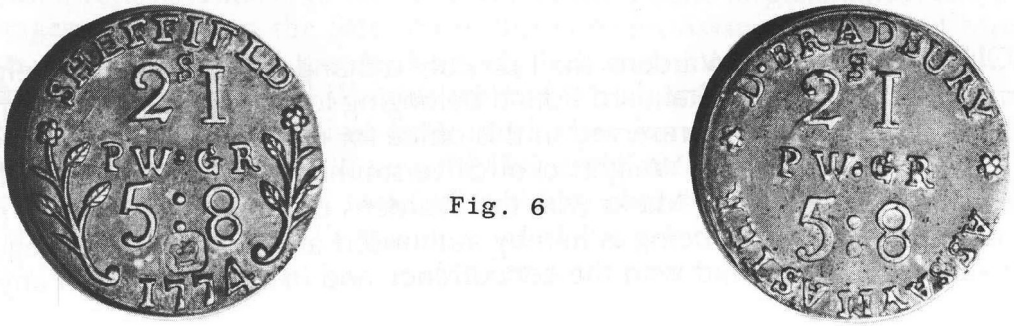


Fig. 6

Fig. 7

The Assay Master was named, the city was named, the mass of the weight was quoted in pennyweights and grains and the weight was dated. The revelatory aspect is that the Assay Master was Daniel Bradbury, the date was 1774, and the city was Sheffield. Daniel Bradbury was appointed Assay Master of Sheffield. Assay Office in 1773 and what is more, the weight was counterstamped with the official Sheffield hall mark, a crown, Fig.7.

Now, the Birmingham and the Sheffield Assay Offices were simultaneous foundations and it is tempting to draw other conclusions too; that, as the weight was dated 1774, Daniel Bradbury may even have got the idea from Birmingham, where there were many brass founders and makers of weights plying their trade.

Furthermore, the part of the weight, to which the Birmingham anchor mark, Fig. 1, was usually applied, was obviously designed for just that purpose. Indeed, it was designed so that the mark appeared to be a feature of the design. This was not unique, as the weights by Phillips (3) appear to have been designed with a central blank portion to take the official crown countermark or stamp of the King's Stamper of Moneyweights, John Whitehurst.

Whilst no single item of the above is conclusive in itself, three assaymasters, one touchmark, an official crown and a weight designed with a space for the mark all taken together provide fairly convincing evidence that the anchor mark on coin weights could well have been put there by the Birmingham Assay Office.

Now, all the best stories have a happy ending, and it is most gratifying at this point to make some additions, discovered shortly before going to press, (1) which document and explain the anchor mark applied to coin-weights;-

Birmingham Assay Office.
A Meeting of the Guardians held
November 9th, 1773.

RESOLVED – That the Wardens shall procure a Standard Troy Pound Weight agreeing with the Standard Pound belonging to his Majesty's Mint which shall be carefully preserved in this office for regulating the Weights used therein as also the Weights of all Silversmiths who now have or shall hereafter enter their Marks with the Wardens of this Office. And the Assayer for the time being is hereby authorised and impowered to regulate and adjust and with the concurrence and in the Presence of any two of the

Wardens of the said Company to strike the Company's Marks (that is to say) the Anchor and the Letter of the Year on all Troy Weights duly regulated and adjusted under his Inspection and to take and receive for his own use for adjusting and marking any single Weight the sum of three pence. And the Assayer for the time being shall at his own Expence provide accurate and proper Ballances of different Sizes inclosed in Glass frames and also Compleat Setts of Weights accurately divided to be approved of by the Wardens for the time being conformable to the Standard pound Weight to be procured from his Majesty's Mint.

Now, whilst it is obviously a necessity to have such a Standard weight for the purposes of assaying, the weight was shortly about to be put to another purpose in addition to that for which it was intended, as is shown by this advertisement:-

BIRMINGHAM ASSAY OFFICE, July 21, 1774.
This Office will be open on Mondays, Wednesdays, Thursdays, Fridays, and Saturdays, for adjusting and sealing of the smaller Sorts of Troy Weights; as Pennyweights, Grains, and the particular Weights now required for the Gold Coin. NEW WEIGHTS are also sold of exact Proportion with the standard Pound Weight belonging to this office, and which was lately adjusted at the Mint.
N.B. The Assay-Office Mark used for sealing weights, is that of an ANCHOR, which it is hoped no person will attempt to counterfeit ; the Penalty for so doing being no less than Transportation for fourteen Years.

Those who would gasp at the severity of transportation for fourteen years merely for the possession of a punch bearing the anchor mark, might like to know that the penalty had just been reduced. It had formerly been the same as that for counterfeiting, clipping and 'shortening' coin;- death by hanging!

Just in case the public were in any doubt about the subject, the advertisement was repeated on August 29th, 1774, but this time telling the public exactly when the Office was open. For those with an enquiring mind, Tuesday was not Early Closing Day in Birmingham, but the day when the assaying of gold and silver was performed, which explains why the Office was closed. Note the reference made to the Standard Weight.

Advertisement. Aris's Birmingham Gazette — Aug 29 1774.

Mr Jackson returns Thanks to his Friends and the Public in general, for the great Encouragement given to the Sale of the Birmingham Assay Office Sealed Money Weights, and begs leave to assure them, that no attention or Expence will be spared requisite to the rendering all Weights marked at the Assay Office accurately true to the Mint Standard; at the same time he is much concerned that any Person should imagine or insinuate that an Anchor may be struck on Brass without offending against the Birmingham Assay Act in which it is clearly expressed that any Person whatsoever being knowingly POSSESSED of any counterfeit mark or stamp, will be liable to Transportation for fourteen years. Mr Jackson therefore in Justice to himself, and all

succeeding Birmingham Assay Masters, and also with a view to the public Utility of well authenticated Weights, thinks it incumbent on him to do every Thing in his Power for preventing the Appearance of counterfeit Marks, and for this Purpose offers a Reward of TWENTY POUNDS to every Person who shall at any Time give such Information as shall lead to Conviction of any Person possessing and making use of a counterfeit Mark, or Marks resembling any of those used by Authority at the Birmingham Assay Office.

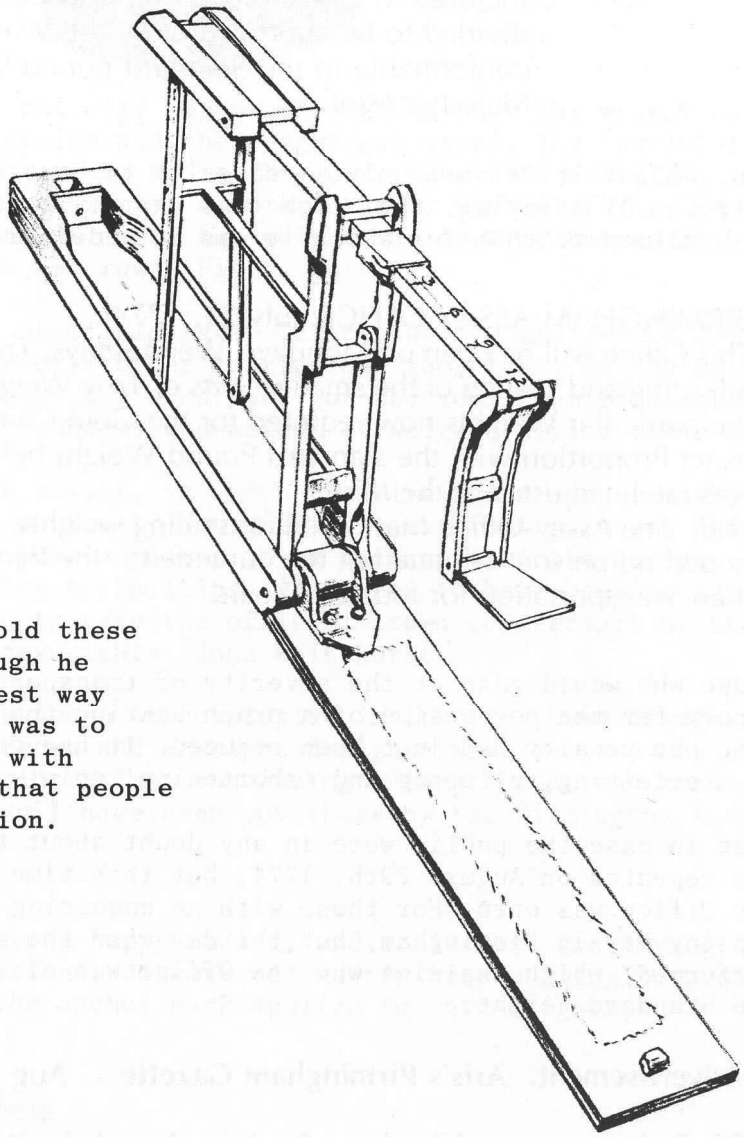


Fig. 8

William Mountford made and sold these folding gold balances, although he obviously thought that the best way to attract customers in 1774 was to emphasize his weights, to go with the equal-arm coin balances that people already had in their possession.

Those selling weights were not slow in jumping onto the bandwagon, and the public who were so minded could purchase weights from a multiplicity of folk offering such items for sale, as this advertisement, also printed on the 29th August, 1774, reveals.

WM. MOUNTFORD Brass and other Metal Candle-stick Maker at No. 23 Catherine-Street, Birmingham, makes and sells upon the very lowest Prices, Wholesale or Retail, Weights for weighing GOLD COIN, of a new pattern, explaining the Weight of the Coin now passing, adjusted and sealed at the Assay -Office in Birmingham; at the Office in

London; or adjusted by himself with an accurate Ballance to the Mint Standard; all the Sorts vary in Price. — Likewise all Sorts of Scales for weighing GOLD COIN warranted well adjusted. — Old Scales repaired.

The weights of a 'new pattern, explaining the Weight of the Coin now passing' must be of the type below, (Fig. 9) or something similar. The 'Office in London' was probably that of the King's Stamper of Money Weights, a post newly created by the Mint, in order to deal with the vast demand for weights created by the new legislation.

A month later, as there was obviously still a considerable demand, traders were trying to be a little different and standards of honesty were beginning to slip.

Fig. 9

Scales, Weights, Cutlery, and Japan Ware

E. COOPER, No. 22, High-Street, Birmingham, makes and sells Wholesale and Retail a great Variety of Scales for weighing Gold Coin, accurately adjusted, and Weights agreeable to his Majesty's Proclamations, assayed and marked at the only authorized Office for assaying and marking Brass Weights in London. THE ONLY OFFICE APPOINTED BY THE KING's AUTHORITY for assaying and marking WEIGHTS. This Mark is the COFFEE-POT or Kind of EWER. Weights at 1s a single Set — Likewise continues to manufacture great Variety of Japan Trays and Waiters, and other Articles in that Branch, and sells London, Birmingham, and Sheffield Hardwares, Cutlery, Dutch and English Toys, on the lowest Terms.

The advertisement used emotive official-sounding words such as 'assaying' when what was clearly meant was 'sizing'. There is no doubt that the public would have been impressed by such words. Birmingham had recently acquired its own Assay Office, not without a struggle.

Exactly what Mr. Whitehurst, the King's Stamper of Money Weights would have said about this, we can only conjecture, but, by all accounts, he was so overworked that he would not have cared very much. The advertisement is instructive inasmuch as it informs us that the price of a set of weights was 1 shilling, though it would have been more helpful if he had stated exactly what a set contained. Presumably it was weights for the guinea and the half guinea, and perhaps the weight for the quarter guinea, 1dwt. 7grains.

The advertisement was not, however, without a modicum of truth, for the Office to which it referred was that of the Beadle of the Worshipful Company of Founders, who sized and marked weights produced by its Freemen and Officers. They did have a Royal Charter, granted by James I, which gave them the right to size and stamp all weights produced, or used within three miles of the City of London and they were disputing the right of Mr. John Whitehurst to do the same job, but that is another story.

Fig. 10

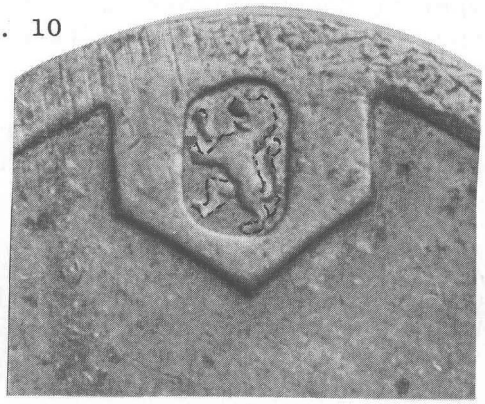
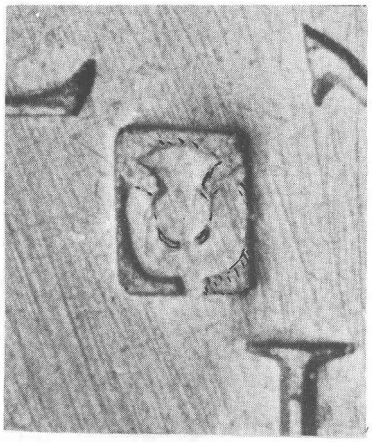
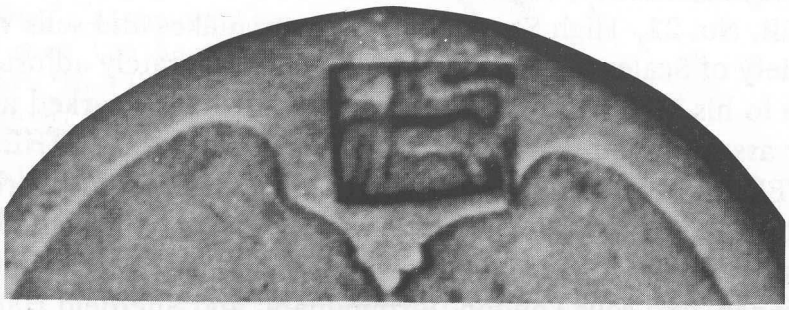


Fig. 11



Anyone who has tried to solve questions of this kind will know that one question being answered, two more are usually posed. This is quite true here. We now need to know whether the lion rampant, Fig.10 and the thistle, Fig.11, countermarks sometimes found on coin-weights are as genuine as the anchor mark.....

Fig. 12



Yet another puzzle is the dachshund style lion passant guardant (Fig. 12) which appeared on some weights in the same position as the anchor. This was the age of counterfeits and evasions, and this must surely be either one or the other? The search continues....

FOOTNOTES

1...Author's correspondence with Sheffield Assay Office

2...Westropp J Proceedings of the Royal Irish Academy, Volume XXXIII, Section C, Number 3, Dublin 1916.

3...Sheppard T & Musham J F Money Scales and Weights, Numismatic Circular 1920-1923. Reprinted by Spink & Son Ltd. London 1975 etc.

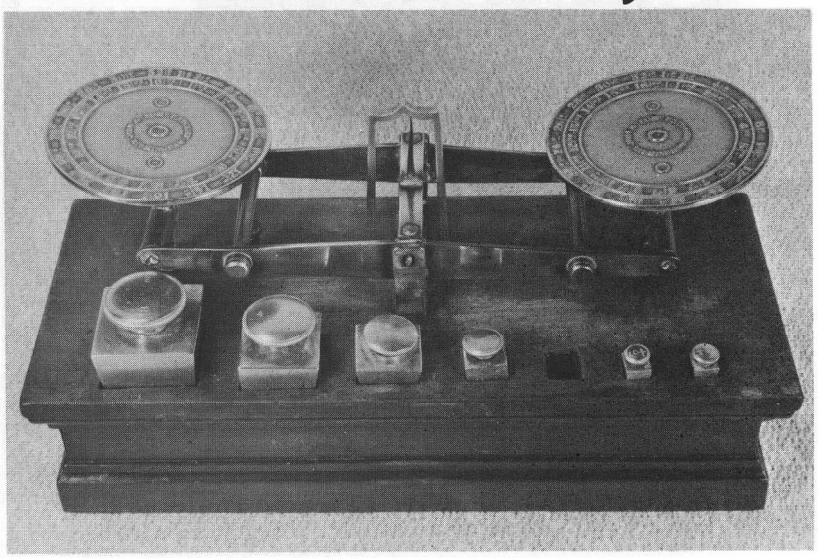
Photographs 1 to 9 were taken by Paul Withers for his comprehensive and precise record of all surviving coin weights for coins circulating in Great Britain and Ireland. He has compiled this massive archive jointly with his wife Bende, and they are working steadily towards publication. If any reader has further evidence to add to this research, please will they communicate with the Withers directly.

The author is grateful to Mr. B Ward, Assay Master of the Birmingham Assay Office for permission to publish the extract from the meeting of the Guardians held on the 9th November, 1773.

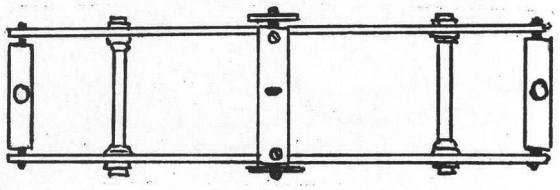
Thanks are also due to the Assay Office, Sheffield and to the librarians of both Birmingham and Sheffield Assay Offices, who have been extremely helpful.

Robervals with Encased Stays

BY D F CRAWFORTH-HITCHINS

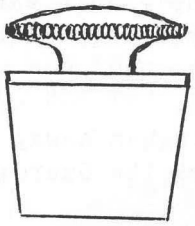


These large, handsome postal scales were made over a long period, by at least 2 makers, but in very small numbers. Few homes would have needed such robust scales for weighing packages, but they would have been useful in offices. They have features in common, all having a double beam with robust spacers between the central pivot and the end pivots, all having a sturdy mahogany box concealing the lower half of the roberval, and all having weights with knobs.



The weights for all the sets by Joseph and Edmund Ratcliff were square , seen from the top, and tapering towards the base when seen from the side, (see Fig. 12 C,) The circular knobs were knurled to give a good grip on them. The ¼, ½ and loz weights were made of solid brass but from 2oz up the weights were made from a cast brass 'cup' with walls

about 1mm thick, into which lead was poured. A flat brass sheet with a hole in its centre was rivetted on top of the cup, also about 1mm thick, and the knob, with a screw protruding from the bottom, was screwed into the central hole.



These cased weights are a sure indication that a set was made by Ratcliff's, even when they did not apply their names. When Edmund Ratcliff worked alone from 1864 until 1881, he continued with the same design of weights.

J & E Ratcliff possibly made a version with round weights, as one was sold in the Essener Waagen Auktion V in 1987, (see Fig. 2,) but it is impossible to see whether the original square holes have been reamed out to take round weights, which would have been easier to replace.

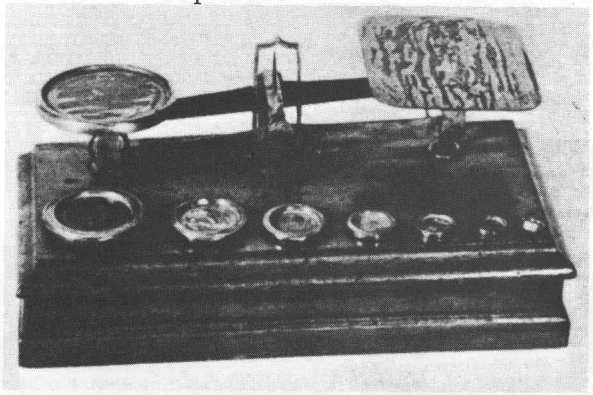


Fig. 2

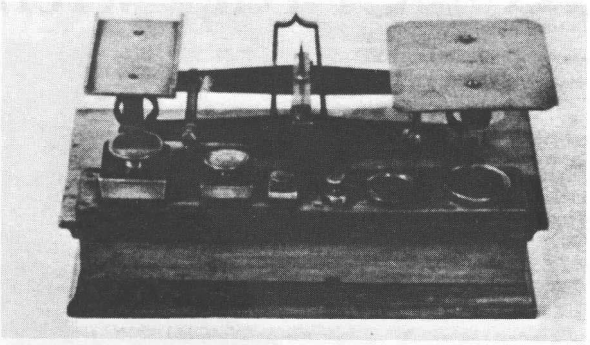


Fig. 3

The second set in the Essener Auktion V, (see Fig. 3,) by J & E Ratcliff has obviously been altered, having a wooden rectangle glued over the original holes. The rectangle has holes for three of the original 'cube' weights, and holes for three round weights. This kind of modification in the life of a scale demonstrates that the scale was still needed even when the little weights had been lost, and it adds to the social history of the scales.

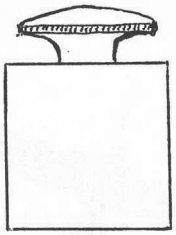
The set stamped 'Waterlow & Sons', (see Fig. 11,) betrays its origins when one examines the weights. They were made as a cast 'cup' with a flat top added;- so the scales were made by E Ratcliff for Waterlow & Sons, who called themselves 'manufacturers' on another of these robervals with concealed stays. They were manufacturers, but they made stationery, stamping and marking documents and specialised supplies for banks.

Waterlow & Sons Ltd. continued to sell these robervals with concealed stays until at least 1908, as they offered them in their catalogue for 1908, but we have no evidence as to who their manufacturer was at that late date.

Samson Mordan & Co. were also manufacturing stationers, but they did make their own postal and coin scales. Their version of the roberval with concealed stays was slightly different from Ratcliff's, in that Mordan used either round drum weights with a smallish knob on top, (see Fig. 4,) or they used a

Fig. 4A

version of the 'cube' weights with straight sides, made of solid brass, with a screw cast integrally with the cube, and the knob screwed onto the top, (see Fig. 5.) Adjustments were made by filing the bottom of the brass cube. The earlier Mordan knobbed weights were very characteristic of Mordan's, in having $\frac{oz}{8}$ on the top, instead of $\frac{8}{oz}$ as shown in Fig. 1. Other early Mordan 'cube' weights had $\frac{8}{p}$, (8 postages,) without the weight, (4oz.) being on the weight. These early weights were made until 'postages' were discontinued in 1871.



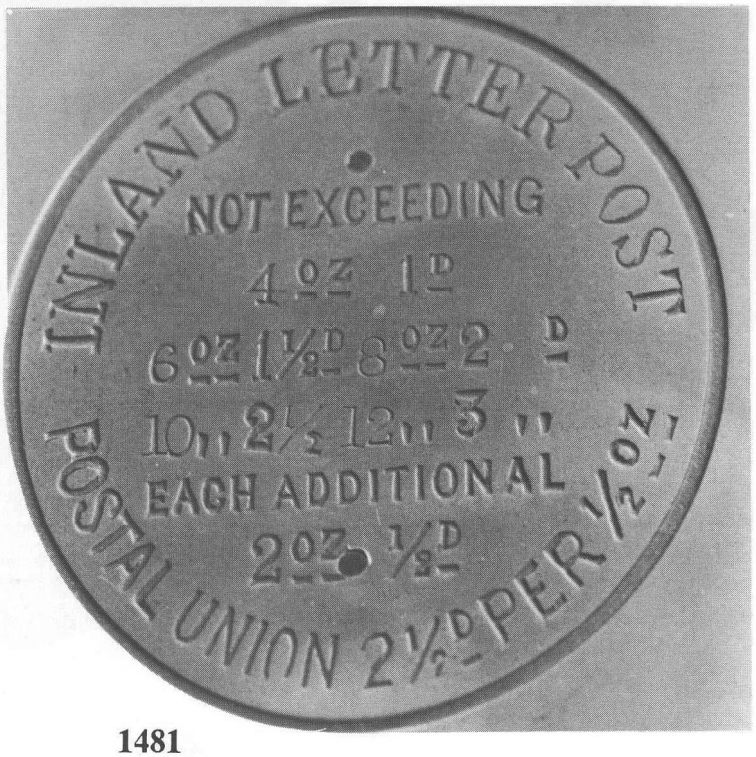
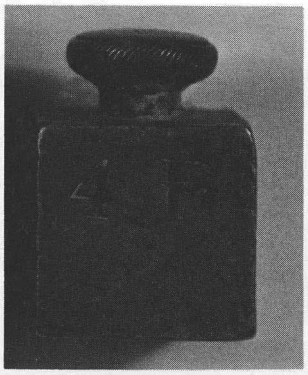


Fig. 4B

Fig. 5



In parenthesis, these weights were also used on postal scales of the equal-arm type, on a pillar, with the weights clustered round the pillar, and held in the mahogany base in fitted holes. (See Fig. 6.) By putting the weights very close to the pillar, the scales could be used without knocking against the weights. Both Ratcliff and Mordan used these 'cube' weights on these rare scales.

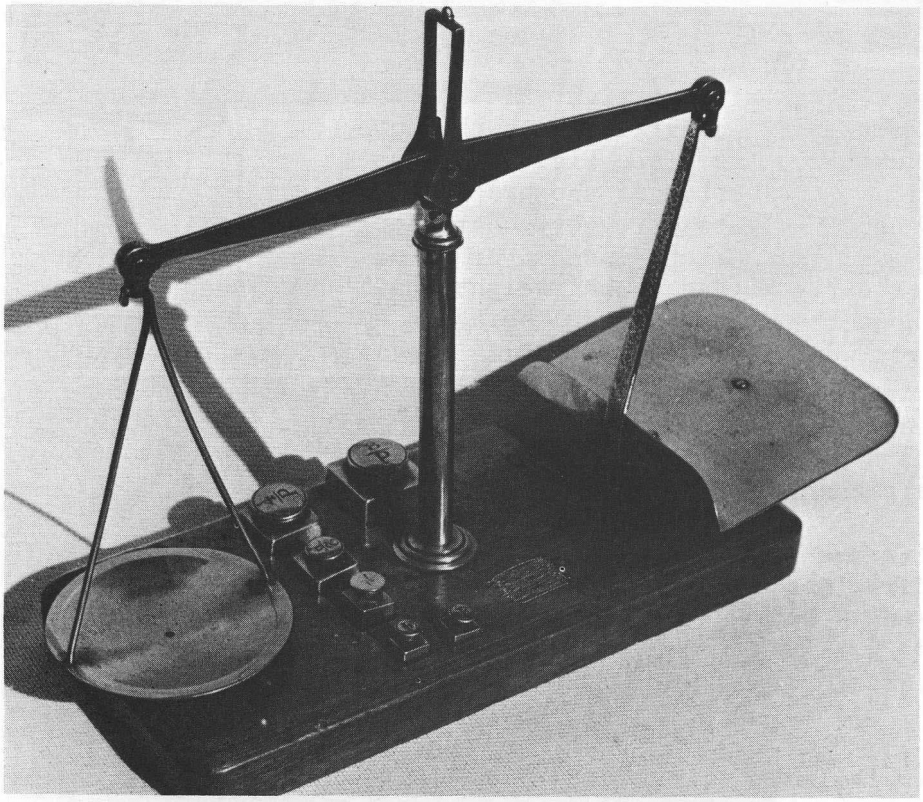


Fig. 6A

The designs of the scales with concealed stays also indicated their makers. Fig. 4 was stamped S Mordan & Co.London, on the beam, but one does not need the name to identify the maker. The straight vertical stay under the pan was a unique feature on Mordan scales, and the weights, stamped $\frac{oz}{8}$, $\frac{oz}{4}$, etc. were uniquely Mordan. The vertical stays had a protruding ledge to prevent the pan dropping too far.

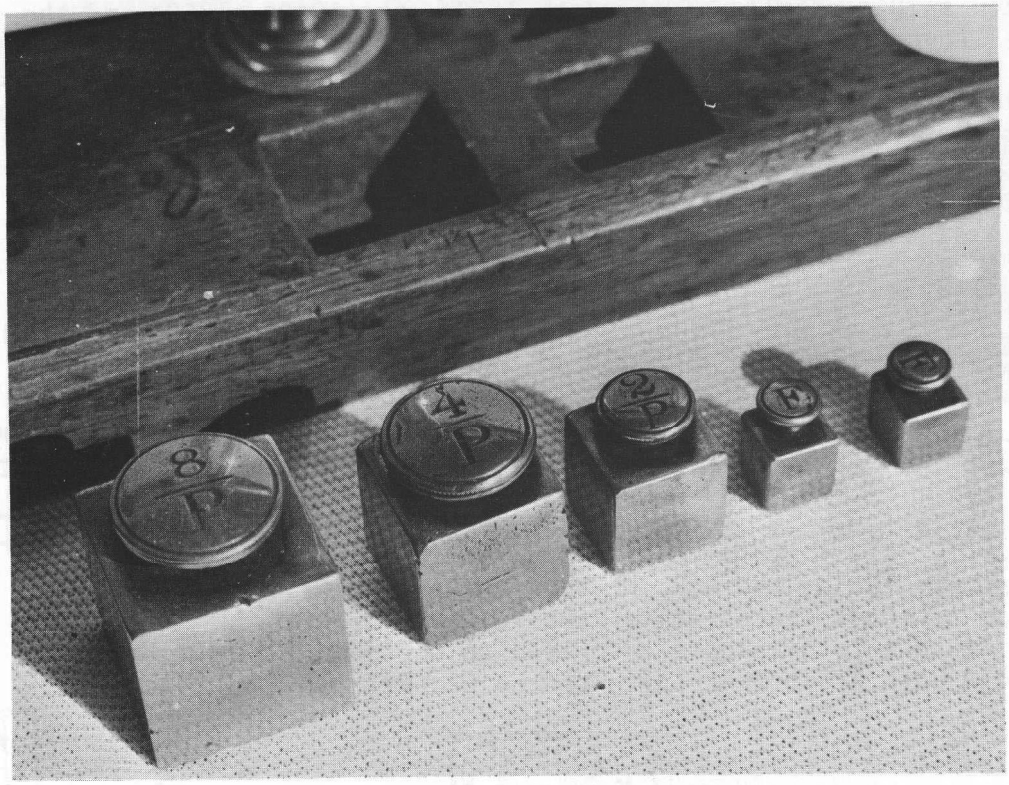


Fig.6B

The letter plate mentioned the 'Postal Union' with France, which was in operation between 1875 and 1906. but the postal rates of 4oz. for 1d. were brought into operation in 1897, so the scales were made between 1897 and 1906. It is strange that the Parcel Rate was not stamped on the letter plate, as the scales were large enough to take a 11b. parcel, and the weights were there to weigh a 11b. parcel. A parcel of 11b. could be sent for 3d. by Parcel Post, whereas it cost 4d. to send it by Letter Post.

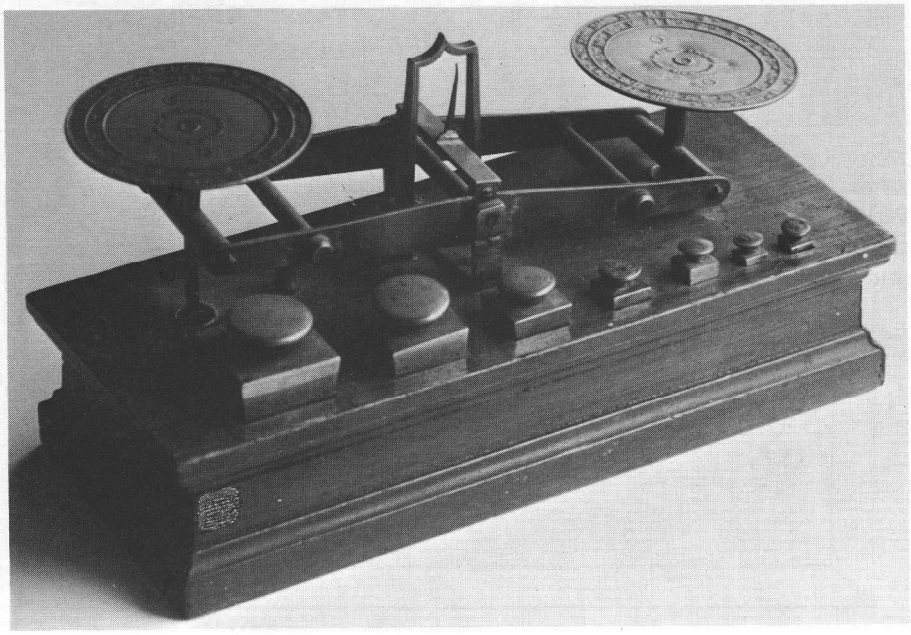
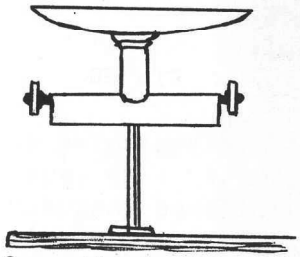


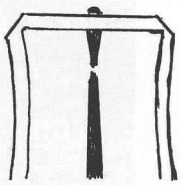
Fig. 7A

Joseph and Edmund Ratcliff of Birmingham had a substantial brass foundry, and were classified in Directories of the late 1830s, the 1840s, 1850s and the 1860s as brass founders, casters, stampers and makers of chandeliers and gas fittings, so brass letter scales fitted well into their manufacturing methods. When Edmund Ratcliff worked alone from 1864 until 1881, he was classified as a letter scale and letter clip manufacturer.

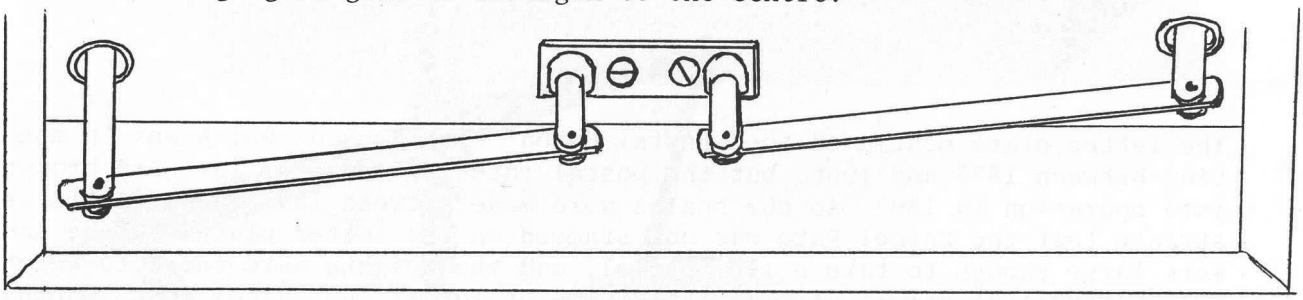
Fig. 7 is very characteristic of the Ratcliff's work. They had two basic designs, one mainly for their larger scales, (Figs. 1, 7, and 9,) and one design mainly for their smaller scales, (Figs. 2, 3, 8, 10 and 12.)

This larger design, shown in Fig. 7, had a fixed joint under the pan, and the horizontal tube dropped down on to the raised brass collar on the wooden box. Most of the larger sets had a flat blued-steel pointer, as this set had, and occasionally Ratcliff's fitted a flat-topped shears instead of the more common pagoda top used here.





The larger scales had a special construction inside the box, whereby the stays coming from the bottom of the vertical stays went to two small forked brass pillars fixed to a brass plate screwed to the centre of the box. The extra knife edge gave greater strength to the centre.



The ornamental pressed letter plates in Fig. 7B showed the letter rates used between 1840 and 1865, but as Edmund was alone after 1864, the scales were probably made between 1840 and 1864. This same decorative plate was also used on Ratcliff's equal arm pillar scales with the cluster of 'cube' weights round the pillar, (see Fig. 9.)

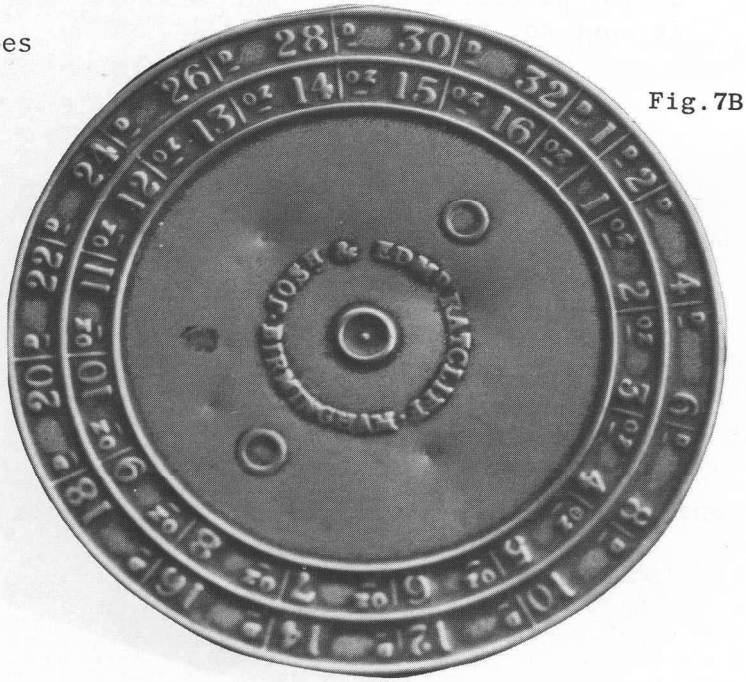


Fig.7B

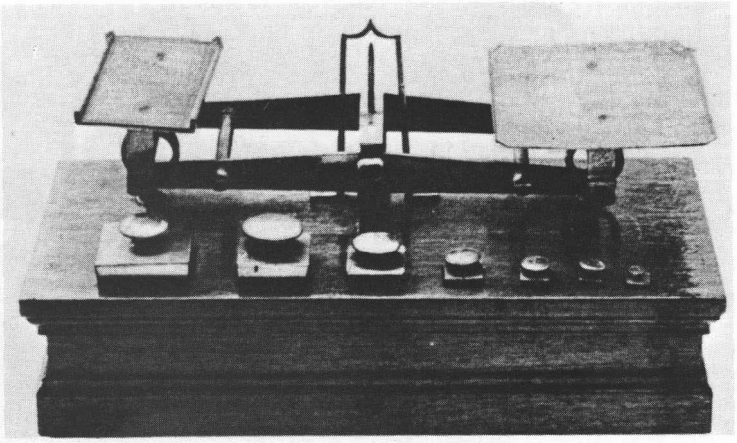
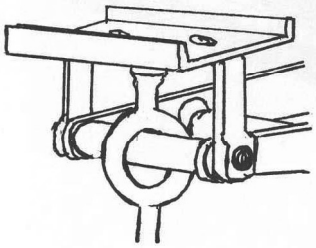


Fig. 8

The unnamed scales in Fig. 10 show how Ratcliff's designed for their smaller robervals with encased stays. The stay under the pans was not fixed to the horizontal tube, but went round the tube by a substantial ring, and the ring dropped down onto the raised collar in the wooden box. The ring was only used by Ratcliff's, and shows distinctly in Figs. 2, 3, 8, 10 and 12.



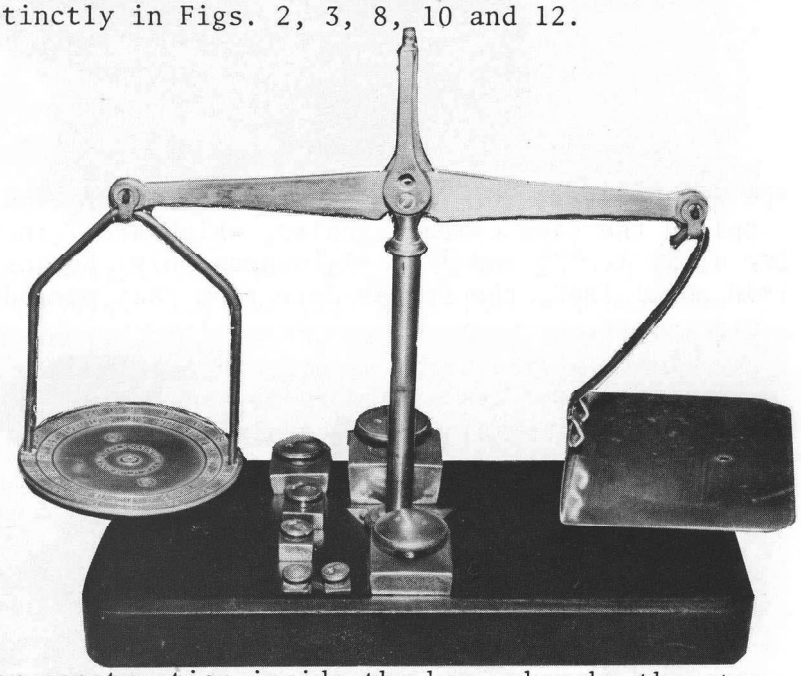
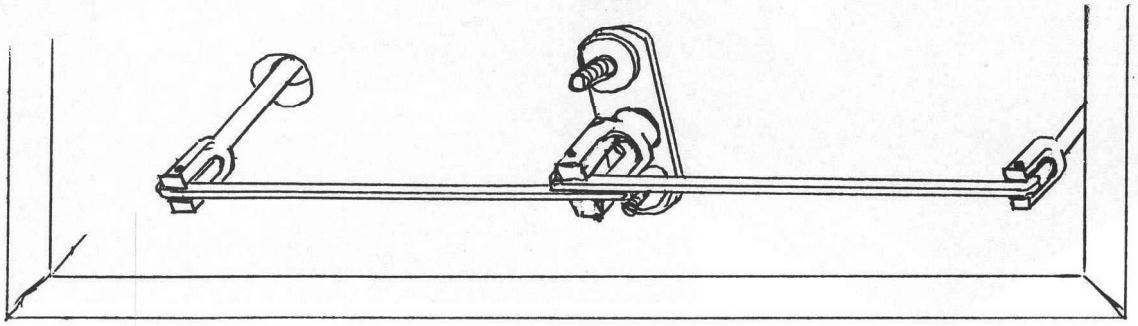


Fig. 9

The smaller scales had a simpler construction inside the box, whereby the stays coming from the bottom of the vertical stays went to one forked brass plate in the centre of the box.



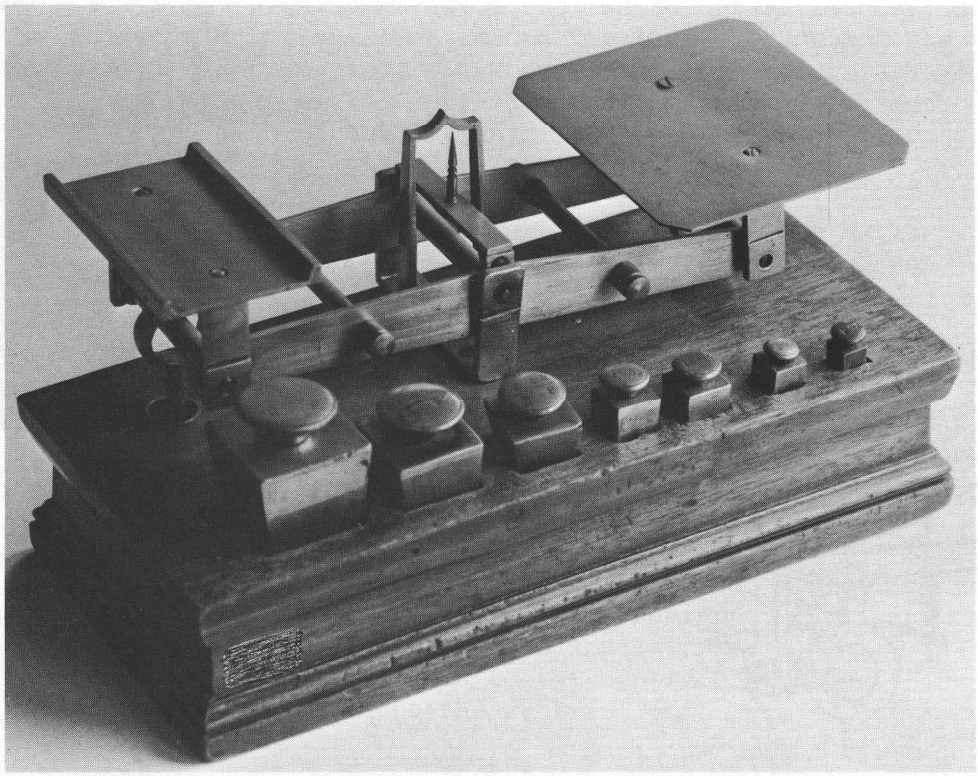


Fig. 10

The weights were for 8oz 16P, 4oz 8P, 2oz 4P, 1oz, 1/2 and 1/4, 1/4. but Ratcliff's also supplied the same compact scales, which are 7 inches long, (195mm.) with weights for 4, 2, 1, 1/2 and 1/4, 1/4 ounces only. Because 'postages' were current from 1840 until 1865, the scales date from that period.

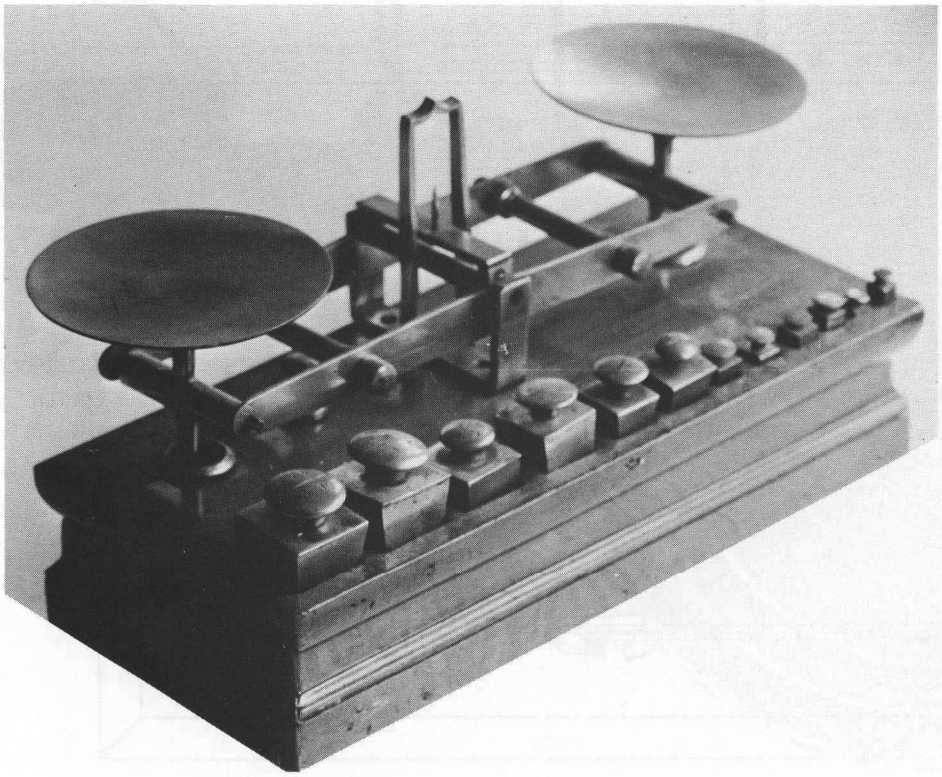


Fig. 11

The large set, illustrated in Fig. 11, pulls together much of the evidence discussed above. The name Waterlow & Sons, London on the beam was applied by Edmund Ratcliff on behalf of the stationers Waterlow & Sons, as mentioned in paragraph 5. The stays beneath the pans were characteristically Ratcliff designs, the original weights were also Ratcliff's.

Another identical scale exists in a private collection, but with Josh & Edmd Ratcliff PATENTEES on the beam. If Ratcliff's were 'patentees', they were not patentees of this scale. Either they were trying falsely to protect their design, or they had a patent for something other than a postal scale.

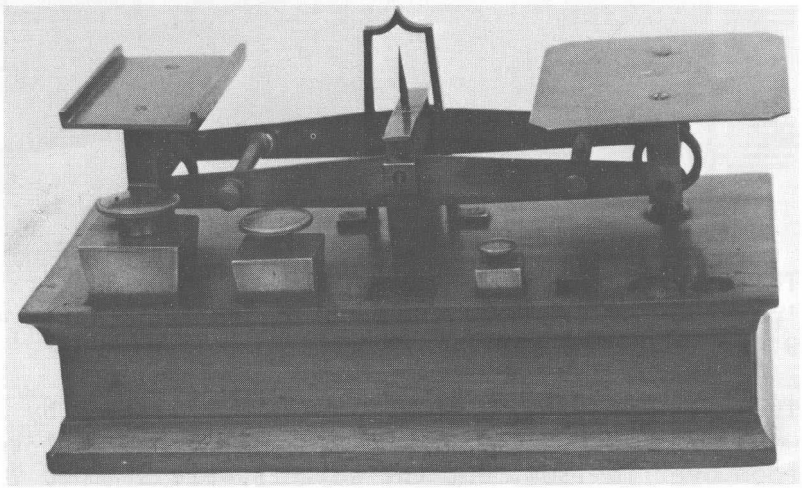


Fig. 12A

The Waterlow & Sons scale now has weights for (1) $\frac{8oz}{3P}$ (2) $\frac{8oz}{3P}$ (3) $\frac{4oz}{2P}$ (4) $\frac{4oz}{8P}$ (5) $\frac{2oz}{1P}$ (6) 2oz (7) 1oz (8) $\frac{½oz}{1P}$ (9) ½oz (10) ½oz (11) ¼ (12) ¼. The original weights were numbers 1, 2, 3, 5 and probably 10 and 11, as they give the cost in pence of the stamp needed, below the weight . These rates were current between 1871 and 1897. The use of two weights of each size was very uncommon, but even more uncommon was the use of three weights of the largest size, (to give a total capacity of 4lb,) having been seen only once.

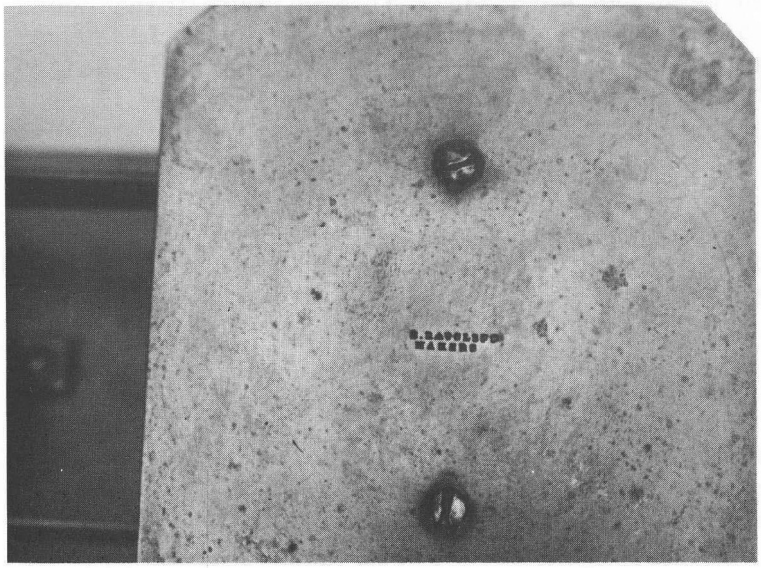


Fig. 12B

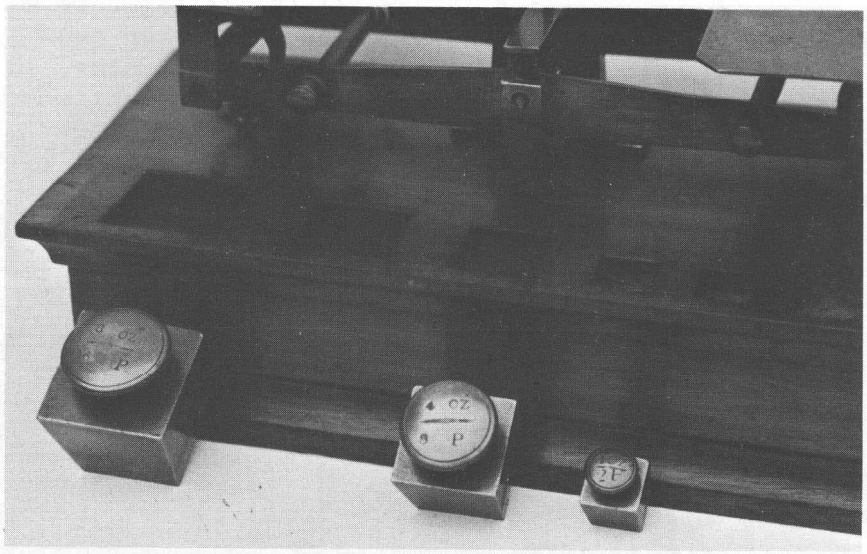


Fig. 12C

The additions included two older weights, numbers 4 and 8, from the period when 'postages' were used, and some weights of indeterminate period, numbers 6, 7, 9 and 12.

The last set looks like a typical smaller set by J & E Ratcliff, but on the pan was stamped 'E Ratcliff, Makers' with the 'J &' removed from the stamp. Edmund took over in 1864, but the weights were stamped 8oz, 4oz and .1oz. These rates were current until 1871, so this set can be dated between 1864 and 1871. Few of us have scales that can be dated so precisely.

The author thanks Lou uit den Boogaard, without whom this article would not have been written. Contributions were made by Jerry Katz, Bill Doniger, Bob Stein, Bob Roberts, Essener Waagen Auktionhaus and Numismatica, Wien.

Joseph Richardson~Importer

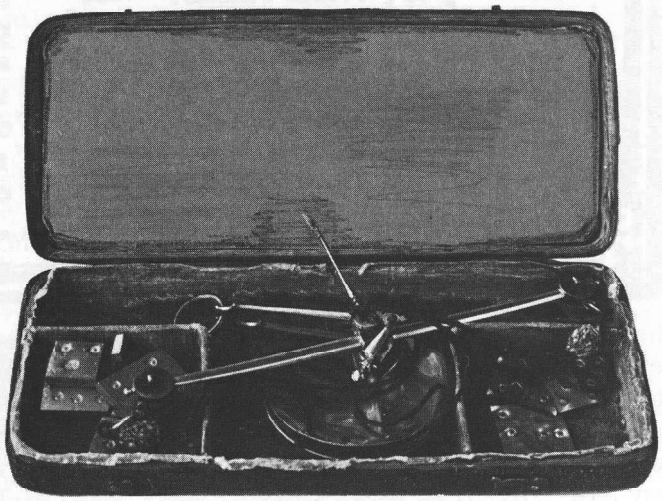
Compiled from material sent by E NEWMAN.

In the Pennsylvania Gazette for 19th April 1744, there was an advertisement; *'Lately Imported from London, and to be Sold by Joseph Richardson, Goldsmith, A Parcel of Gold Scales and Weights from One Ounce to half a Grain, in Black Shagreen Cases.'*

These parcels usually contained between forty eight and seventy two sets of gold coin scales, and throughout his forty years of working life, Joseph Richardson ordered parcels of scales from business associates in London, so that he could retail them in Philadelphia. Richardson was very specific in what he ordered, and he expected scrupulous attention to be paid to his instructions, changing his supplier when he was dissatisfied.

In 1759 he ordered, *'1 Doz. Pair of Gold Scales & Weights in Shagreen Cases.'* These cases were the most expensive used for coin scales, being made of up to seven laminations of thin wood, covered with the tanned skin of the dog shark, a small shark native to British sea-coasts. The skin had a very tough dark grey mosaic of little humps, which gave an enduring cover to the plywood. The whole boxes were lined with green silk and/or green silk velvet normally, little pens were glued into the boxes to prevent the weights sliding around, and to trap the pans and beams. The commoner boxes were held shut by two brass hooks and staples on the front edge of the boxes, but the luxury versions were held shut by heavy brass push-button catches. See Fig. 1.

Fig. 1

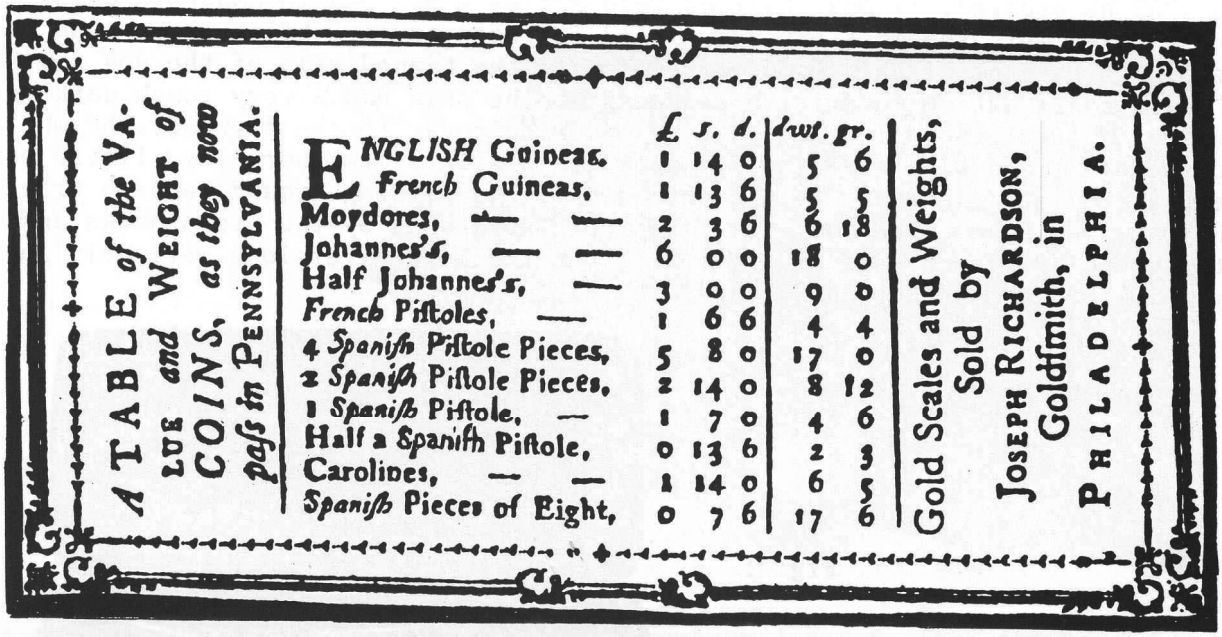


It is somewhat surprising that Richardson wanted the plywood boxes, as the damp conditions of the sea crossing must have caused warping, unless they were very neatly packed pressing against each other.

In 1769 Richardson wrote to John Masterman in London, requesting; *6 Doz. Pair Gold Scales & Weights 9dwt to $^1/_2$dwt & a Set of Grains in Shagreen Cases the Pennyweights I would have about 1 grain over weight that I may regulate them myself. The Scale Beams Should be well Oiled and wrapt in Oil Paper to Prevent there (sic) Rusting.'* If Richardson had been an English retailer, he would have requested weights for the coins currently in circulation in Britain, but in Philadelphia a far greater range of coins circulated;- well over twenty- so that it was more practical to carry pennyweights and grains, and to use Richardson's chart to find out whether a coin was of full weight. It is difficult to imagine what happened when a coin was deficient in gold, because Richardson valued each coin at a different rate;-

GUINEA.....	6	shillings	&	6	pence	per	pennyweight	or	at	$3\frac{3}{16}$	pence	per	grain
MOIDORE.....	6	"	"	6	"	"	"	"	"	$3\frac{3}{16}$	pence	per	grain
JOHANNES.....	6	"	"	8	"	"	"	"	"	$3\frac{1}{3}$	"	"	"
FRENCH PISTOLE..	6	"	"	7	"	"	"	"	"	$3\frac{1}{5}$	"	"	"
SPANISH PISTOLE.	6	"	"	$4\frac{1}{4}$	"	"	"	"	"	$3\frac{1}{6}$	"	"	"
CAROLINE.....	5	"	"	6	"	"	"	"	"	$2\frac{3}{4}$	"	"	"

Fig. 2



A TABLE of the VALUE and WEIGHT of COINS, as they now pass in PENNSYLVANIA.

	£	s.	d.	dwt.	gr.
ENGLISH Guineas,	1	14	0	5	6
French Guineas,	1	13	6	5	5
Moydores, — —	2	3	6	8	18
Johannes's, — —	6	0	0	18	0
Half Johannes's, —	3	0	0	9	0
French Piſtoles, —	1	6	6	4	4
4 Spaniſh Piſtole Pieces,	5	8	0	17	0
2 Spaniſh Piſtole Pieces,	2	14	0	8	12
1 Spaniſh Piſtole, —	1	7	0	4	6
Half a Spaniſh Piſtole,	0	13	6	2	3
Carolines, — —	1	14	0	6	5
Spaniſh Pieces of Eight,	0	7	6	17	6

Gold Scales and Weights, Sold by JOSEPH RICHARDSON, Goldſmith, in PHILADELPHIA.

These differences were not mentioned on his chart. (See Fig. 2) Was there a general agreement that every grain lost from any coin was of the same value, say, $3\frac{1}{4}$ pence? At least trade could function if there was an agreement. (George Plumly specified $2\frac{3}{4}$ pence per grain for gold or 5 shillings & 6 pence per pennyweight, regardless of the source and purity of the gold, but Richardson did not make life so easy.)

To return to the order Richardson made in 1769, the problems of salty air at sea caused all importers of British iron goods much heartache, and British exporters got a flood of letters requesting better packing, which they seem to have ignored consistently, judging by the way the complaints continued. Considering that the British were said to be a seafairing nation, it is surprising how ignorant they were of the effects of salty air on iron, and how little they cared about the quality of the goods arriving overseas.

The 1769 order was altered by Richardson, who decided that he needed two dozen shagreen cases and four dozen wooden boxes. Three of his surviving sets were in oak boxes, which implies a change of policy by Richardson. Generally the oak boxed sets were not of the high quality of the shagreen cases sets. The swan-neck beams were probably similar, but the elegance of the shears was inferior, the pointer plainer, the cords were without gold balls decorating their join, and the boxes were not lined with silk, just with green baize. In other words, shagreen sets were expensive but oak sets were cheap.

By 1770 Richardson needed more scales and he ordered four dozen wooden boxes and three dozen in shagreen cases. He ordered the same weights as in 1769, 9 dwt down to $\frac{1}{2}$ dwt, overweight so that Richardson could adjust them himself, plus a set a grain weights for each box. He also ordered *'Three Nests of Troy weights, 32 oz. in a Nest, one of them Regulated to the Greatest Exactness agreeable to the Standard of England.'* These sets were bronze cups, nesting inside each other, filed on the bottom to be accurate. The specification of 32 oz. Troy showed an interesting anomaly in the use of Troy weights. 32 oz. Troy was $2\frac{2}{3}$ lb. Troy, and seemed a peculiar quantity to have, but a set of

32 oz. meant that the outer cup (which may or may not have had a lid,) weighed 16 oz. Troy, the next 8 oz. Troy, 4 oz, 2 oz, 1 oz, $\frac{1}{2}$ and $\frac{1}{4}$, $\frac{1}{4}$ oz. Troy, giving a total weight of 32 oz. Troy. A Troy pound could be found by using the 8 oz. and the 4 oz. together, but in fact, jewellers and bullion dealers tended to think in Troy ounces and never mentioned Troy pounds.

The set of Standards ordered by Richardson could have been for the use of Philadelphia Officers, as mentioned on page 1470, or for the use of Richardson himself when he wanted to adjust weights for sale. Unfortunately we have no record as to which scale maker fulfilled the order that was sent. It could have been Samuel Freeman the 3rd. or Samuel Read, both of whom made Standards.

Richardson's decision to get cheap oak boxed sets did not satisfy him, as he wrote on 1st. May 1771, that they were '*not altogether agreeable to my mind as the greatest part of the scales are very ordinary.*' However, he continued to order parcels of oak boxed sets, (using the term 'wainscot' which derived from the use of oak panelling to form the wainscot of domestic houses in the 17th century.) but from a different Londoner, a clockmaker called Thomas Wagstaffe, who lived at the sign of the Ship and Crown, at the corner of Nag's Head Court, 33, Gracechurch Street, London. This order of 1771 raises more interesting conjectures.

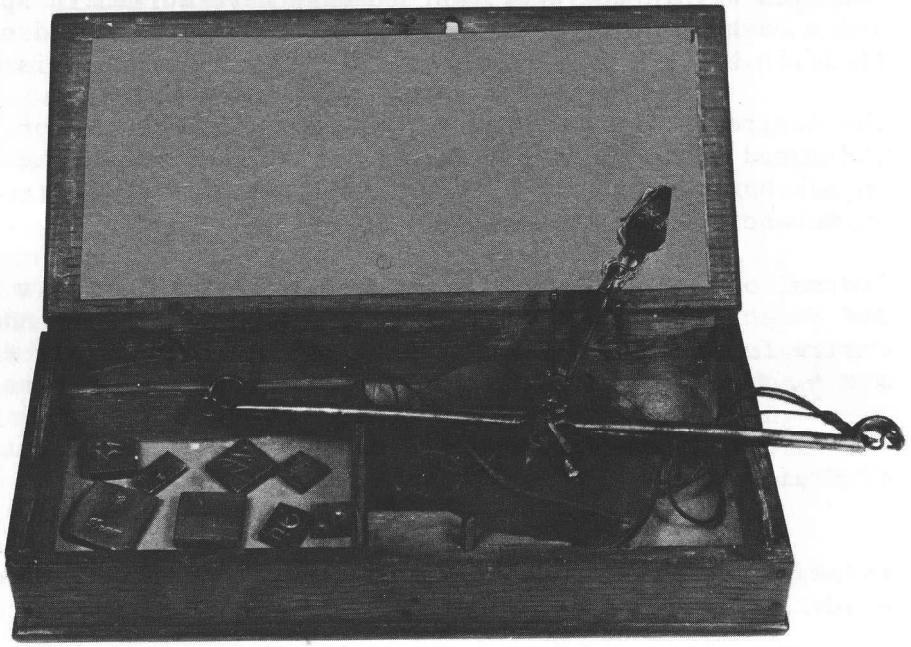


Fig. 3

'I have herein Inclosed a Bill of Lading for a piece of Gold weighing 7 oz. 5 dwt. 8 gr. for which I desire the favour of thee to send me a parcel of money scales one half to be 6 inch & the other half 7 inch Beams & Weights from 9 dwt. to $\frac{1}{2}$ dwt. & a set of Grains to each pair of wainscot boxes which I think was the size of the last thee shipt me & were Charged at £ 0 38 0 per doz. I whould have them full as good as the last thee sent me & request that they be well oiled to prevent their rusting for want of which many of the former came in a very Rusty condition whatever the extraordinary Expence may be I shall Chearfully Pay. The pennyweights I would have one Grain over weight I should be pleased to have one Doz. Pair of scales of a better sort & of 2 or 3 Different prises which may serve as a sample for the future please to send them per the first Oppertunity as I much want them & I shall be much Obliged to thee...'

The mode of speech used for this letter is consistent with the writer's being a Quaker, or member of the Society of Friends, and possibly explains the trusting way he sent such a valuable piece of gold to a man two thousand miles away.

The piece of gold was worth £564.7.2 at London prices and Richardson wanted money scales costing only 38 shillings per dozen. He could not have needed 297 dozen sets of scales, so we must assume that there was a tacit agreement that part of the value of the gold would be held by Wagstaffe to be used for future orders. Richardson did not even specify how many sets of scales he needed, but possibly the previous order, (which was not recorded in his Letter Book,) gave Wagstaffe an idea of how many were needed.

The valuable lump of gold being sent by a ship's captain, was by no means outstanding by Richardson's standards. He sent gold weighing 15 oz. 7 dwt. 12 gr. and another lot weighing 22 oz. 4 dwt. 12 gr. to obtain silver plate, coral pacifiers, thimbles, buttons and buckles. The thought of sending something worth £1727.18s, perhaps £50,000 today, across the sea in a vulnerable wooden ship seems foolhardy to us, accustomed as we are to bankers' drafts and orders supplied within the week, but it must have worked in spite of occasional losses and a cash flow measured in years not months. Richardson would not have done it, if it hadn't been a satisfactory way of earning his living for 40 years.

The desire for scales of a better sort, and for two or three different prices, indicated that Richardson was still worrying about the quality of the scales in oak boxes. He sounded much happier in his next letter to Thomas Wagstaffe, in October 1771;-

'Parcel of Scales & weights which came in good order & to Satisfaction except the Weights which are most of them too light. I have now sent Some Weights & Desire for the future they may be made Exactly of the same Weight. If they are $\frac{1}{20}$ of a grain lighter they will not Suit. Send also

20 pair of Scales with Box end Beams, 6 and $\frac{3}{4}$ inch Beam in Mahogany cases, with a 9dwt, a 6dwt, a 5dwt, a 3dwt, a 2dwt, a 1dwt & $\frac{1}{2}$dwt. & a Sett of Grains to each pair.

20 Pair Scales in Black Shagreen Cases

1 Doz. Neat Small Pocket Scales in Shagreen Cases, the Beam not to exceed 3 inches with the following weights, a 5dwt, a 4dwt, a 3dwt, a 2dwt, a 1dwt, and $\frac{1}{2}$ & a Sett of Grains to each pair.'

The tiny $3\frac{1}{2}$ inch shagreen cases must have been very carefully packed with penny weights, to get so many weights into so small a space.

The profits on each set of scales cannot be calculated, as his notes on prices received for scales sold did not mention the quality of each set;-
Sold 3 pair of Scales & 1 Nest of Crucibles- £1.17.6.
Sold 2 pair of Scales;- £1.4.0.
Sold 3 pair of Scales- £1.16.0.
Sold 3 pair of Scales- £1.16.0.

If Richardson sold the oak boxed sets, (which cost him 38 shillings per dozen,) at 12 shillings a set, he made a nominal profit of 8/10 on each. However, that does not take into account the high cost of insurance he paid, (about a quarter

of the value of the goods insured,) the cost of extra packing, his shop overheads or the commission paid to Thomas Wagstaffe. Also these retail prices might have applied to the more expensive shagreen cases sets, which probably cost him nearly twice as much as the oak boxed sets. All in all, although scales cost the customer three times as much in Philadelphia as they did in London, Richardson probably made no more profit than a London retailer.

In October 1773 Richardson sent an exasperated letter to

Respected friend Thomas Wagstaffe
Thinc of the 17th and mo. last is before me. And am Sorry thee Should have Changed the workman from a Better to a Worse for I never had Such flat Beamed Scales from thee before Nor Never Desire any more of them. I have Now Shipt a Piece of Gold weighing 10 oz. 6 dwt. 12 gr. & Desire the favour of thee to Send me as many Pair of good Scales & Weights for Weighing of Gold as the Money will Pay for. I would have them Round Beams 7 inches Long in Wainscot Boxes Or in Mahogany Boxes if the Difference Don't Exceed 3 or 4 (shillings) per Doz. Please to Order them to be well Oiled to Prevent there Rusting & the Penney Weights I would have one Grain & no more Over Weight, the Weights to each Pair of Scales as follows, one 9dwt, one 6dwt, one 5dwt, one 4dwt, one 3dwt, one 2dwt, one 1 dwt, one $\frac{1}{2}$ and a Sett of Grains. As I apprehend thee art capable of Judging between a good Piece of Work & a bad one, I hope thee will take some Paines to Gett Such as are Good & Well Made which Will Oblige thy friend who would Do as much for thee if it Lay in his Power

Joseph Richardson

P S I have Also to Request thee would Send me an Account how much Below Standard the Gold herewith Sent is & that there May be no Ballence Left unpaid but that our account may be Settled thy Complyance herewith will oblige thy friend , Joseph Richardson.
In my Letter By Captain All I Rote for Insurance on the above.

When Richardson referred to the change in workmen, it might be understood to mean that Wagstaffe was making the scales on his own premises, which was done by a few clock and watchmakers during the 18th century in London. It was far more common to go round to a specialist and buy wholesale from him. Of course, Richardson may not have known the working practices of London Guildsmen, and been thinking of how they worked in Philadelphia.

The gold was obviously gold ore, not pure gold, and this might explain the apparently vast investments that Richardson was sending to London.

He would have been pleased with the scales in mahogany boxes, if Wagstaffe did decide to send them, as they were normally of higher quality than the oak boxed sets. The mahogany boxes were frequently cut from solid, and were nice to handle.

The inventory of goods made when he died in 1784 included *'133 pair of Scales in boxes with weights, 5 pair of plate Scales, 10 Setts ounce weights, 62 setts pennyweights & 102 setts grains.'* valued at £75, and 7 small scale beams.

The plate scales were probably scales used to weigh silver plate or hollow ware, so were probably large bullion scales on pillars used in his shop. His stock of 133 pairs of scales seems to imply a slow turn-over of scales, pessimism about when new stocks would arrive, or a long-term view that traders would always need coin-scales and that he couldn't have too many of a good thing.

James Jackson~ Jeweller's Initiative?

BY D F CRAWFORTH-HITCHINS

James Jackson, the first Assay Master of the Birmingham Assay Office, (see pages 1471 to 1478,) started his professional life as a jeweller. He advertised in a local newspaper of 23rd July, 1750, 'James Jackson, Jeweller at his Toy Shop in the High Street, Birmingham.' A Toy Shop was not a place to take a child into in 1750, rather it was a place to take a wife or sweetheart, as it was a shop selling small metal goods, such as pen-knives, corkscrews, candlesticks, needles and spectacles. James Jackson would have made the jewellery and bought the other items from his neighbours, as Birmingham was full of little workshops turning out millions of 'toys', many of which were exported to France and America.

James Jackson was appointed Assay Master in 1773, and perhaps it is not too fanciful to believe that the situation that he became aware of, with great numbers of clipped and forged gold coins, started him in the coin-scale business. Being a true man of Birmingham, always ready to exploit a perceived gap in the market, he made and sold hydrostatical coin balances, with this complicated set of instructions glued into the lid;-

DIRECTIONS HOW TO USE HYDROSTATICAL SCALES

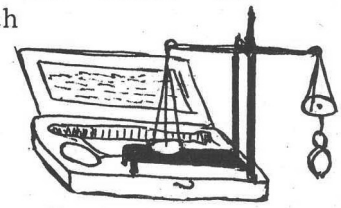
Be careful to fix the reversed Bridge of the Scale Beam steady and even in the slit on the Top of the Frame, so that the Weight-Scale may rest on the Table of the Frame, then fix your piece of Money in the Pincers, and prove the Weight as with any other scales; then immerge the Money and Pincers in Water, and put a Water-Weight marked with the Value of the Money into the Scale over the Pincers (without removing the Grains, if there be any in the Scale for short Weight of the Pieces) and if the Piece of Money sinks in the Water, tis Standard Gold; if not, for every Grain Weight requisite to make it sink, so Many Times Four Shillings are wanting in the value of that Piece.

N B. The Water-Weights are proportion'd to Pieces of Money that are of full Weight; therefore, if any Piece be twenty Grains under Weight, take back one Grain before you weigh in Water.

The only known set with this label was destroyed by German bombs, when Hull Museum was demolished during the Second World War. The set had a manuscript label giving the legal maximum reductions in value of the gold coins in use in England on Sept. 13th, 1773, that is, for the Portuguese Piece, the Moidore and the guinea and their parts.

The box originally contained the eleven weights for the coins mentioned above, the flat water weights with rounded corners for the same eleven coins and a set of grain weights also made of flat brass, but much thinner, and with crisp right-angular corners and dots punched on to indicate the number of grains each weight weighed.

The 'Bridge' of the beam was probably the knife-edge, although it is difficult to understand what Jackson meant by the 'reversed Bridge.' The 'Table' was probably a flat plate at right-angles to the pillar, (which might have been self-erecting,) on which the weight-pan rested, to give stability.



Conjecture only.

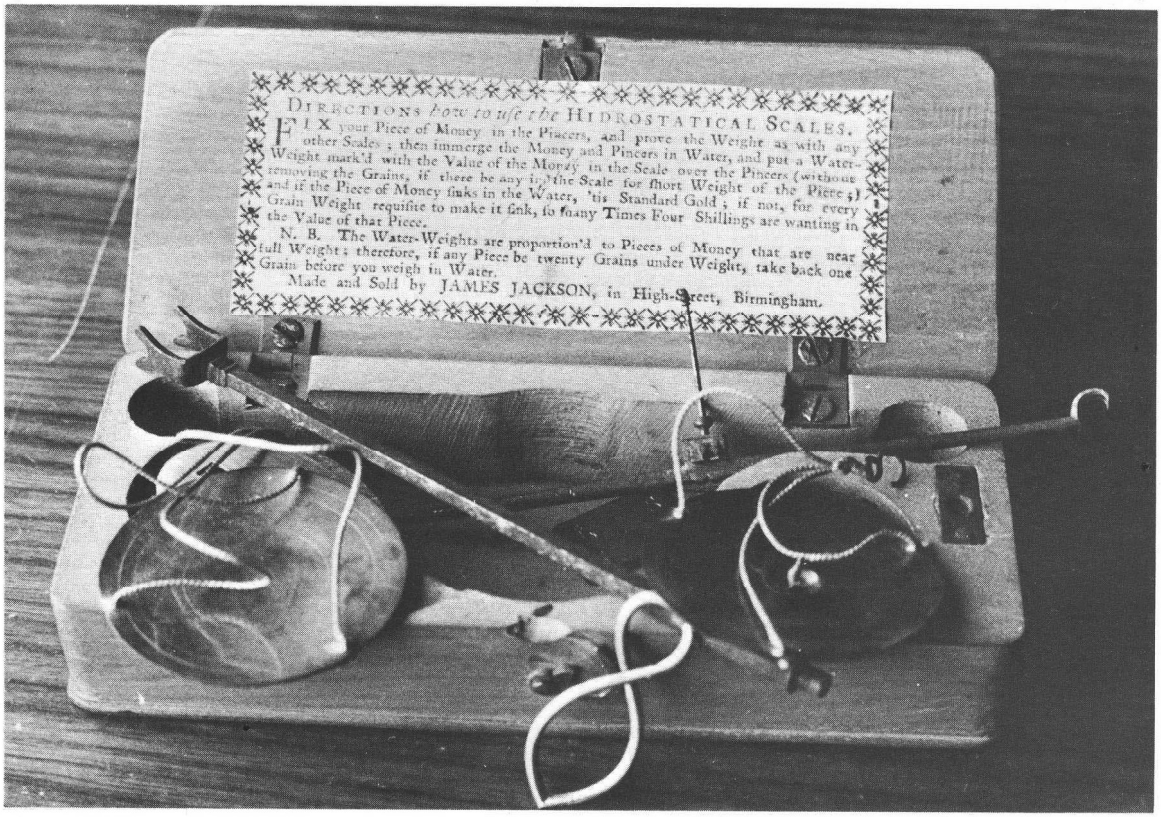
By 1777, James Jackson was classified in the Birmingham Directory as a Jeweller and Goldsmith at 30, High Street Birmingham.He had simplified his Hydrostatical Scales and had a new label printed;-

DIRECTIONS how to use the HYDROSTATICAL SCALES

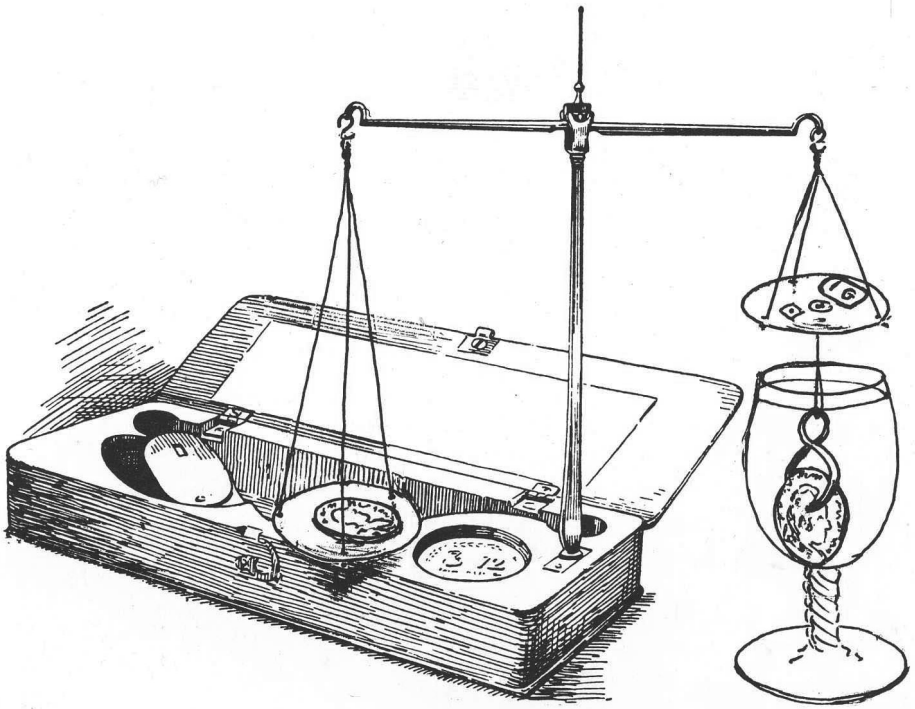
FIX your Piece of Money in the Pincers, and prove the Weight as with any other Scales; then immerge the Money and Pincers in Water, and put a Water-Weight mark'd with the Value of the Money in the Scale over the Pincers (without removing the Grains, if there be any in the Scale for short Weight of the Piece;) and if the Piece of Money finks in the Water,'tis Standard Gold; if not, for every Grain Weight requisite to make it fink, fo many Times Four Shillings are wanting in the Value of that Piece.

N B. The Water-Weights are proportion'd to Pieces of Money that are near full Weight; therfore, if any Piece be twenty Grains under Weight, take back one Grain before you weigh in Water.

Made and Sold by JAMES JACKSON, in High Street, Birmingham.



This box looks absolutely new, with gleaming white pear wood and clean yellow cords, but it is genuinely 18th century workmanship that has presumably been kept clean and dry, wrapped up, without ever having been used. The horse-hair plaited cord, joining the pincers to the pan on the right, is in perfect condition, and the label is pristine.



James Jackson had reduced his 'Frame and Table' to an elegant pillar on which the equal-arm beam could rest without risk of collapse. The drawing demonstrates how the hydrostatical scales were used, with the weight-pan just above the box, so that if the coin was light, the pan dropped on to the box without the weight's slipping off and getting lost on the floor. The coin did not sink until one grain-weight was added above the pincers, (as well as the 1 guinea weight,) and so the guinea must have been worth only seventeen shillings, being partly composed of some base metal. This proved the efficacy of using a hydrostatical scales;- if an ordinary coin balance had been used to weigh the same coin, the guinea would have registered as full weight, and if no coin guage had been used to prove that the guinea was over-sized, the coin would have been accepted as 21 shillings worth of gold.

James Jackson was still making these balances in 1779. Four of this design are known to have survived.

Jackson was very busy, being responsible for the ever-expanding work of the Birmingham Assay Office, so he must have been relieved to hand over the running of the shop to his new partner, Evans, in 1785.

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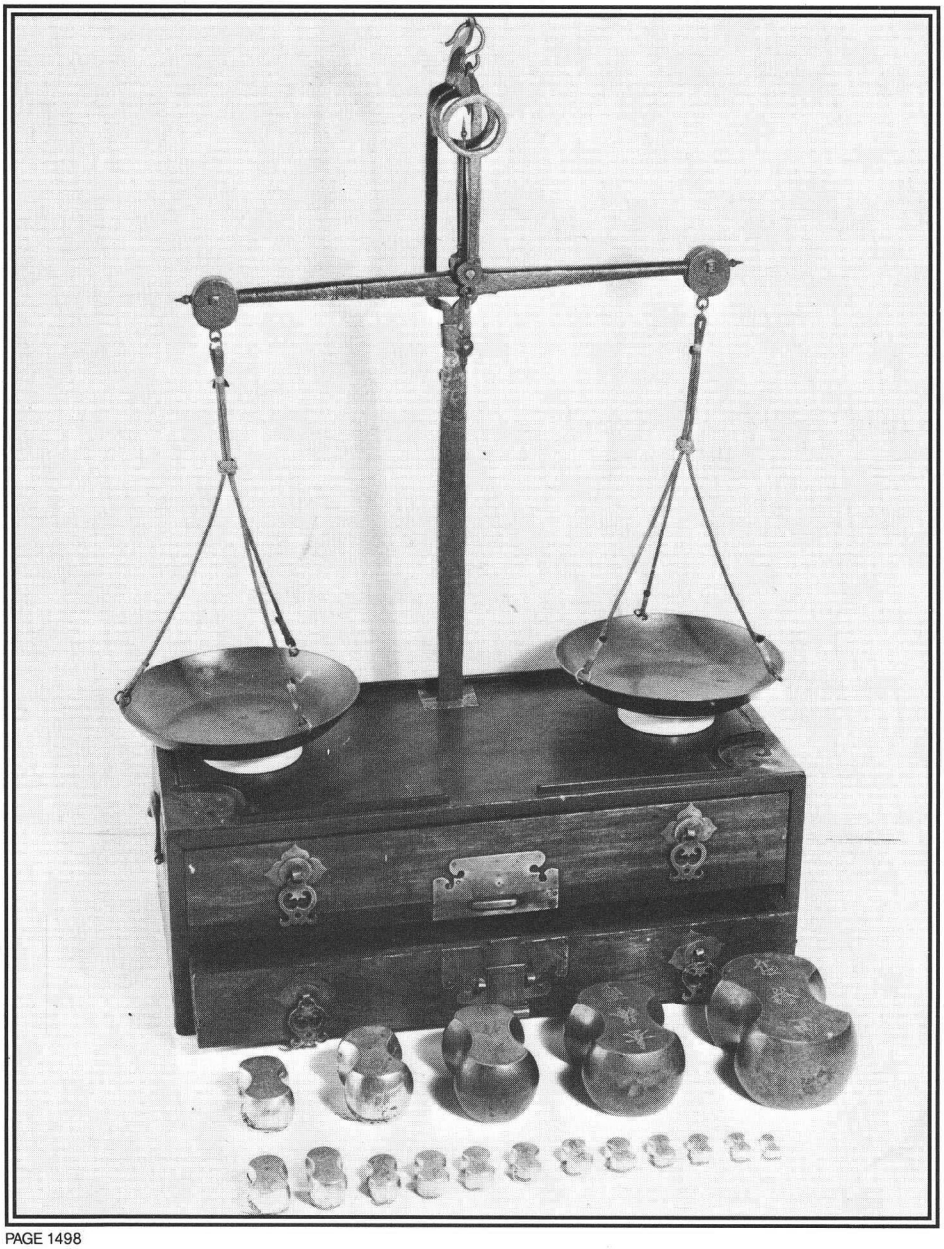

Cover Picture

This fine pillar scale is very reminiscent of eighteenth century English coin scales of half its size. The box end beam with the sight–hole shears is just like the high–quality beams made by Freeman and Sons and their successors, but the cords, the drawers and the weights give the collector clues to the real place of manufacture. As usual, the box gives the clearest clue. The brass fittings are characteristic of Chinese furniture of the early 19th century. The cords have shapely balls on them, but instead of their being at the top, they are slipped down nearly half the length of the cords in the Persian or Madagascar style; that is, in the Indian Ocean style. Did Arabic traders go round to Hong Kong or to Shanghai, using their scales in front of Chinese scale–makers? The weights, shaped like the body of a violin, are Romme weights entirely in the Chinese and Japanese traditional shape, using a decimal system. In 1841, the British arrogantly told their colonial subjects in Hong Kong to change their weight–systems to the 'superior' British system, and they had to abandon their sensible decimal system for 150 years. The Chinese money–changers set up business in the street, changing any gold coins passing through the port, or changing sycee silver (shaped like a snow–shoe,) using their portable scales, which could be dismantled and carried entirely in the chest.

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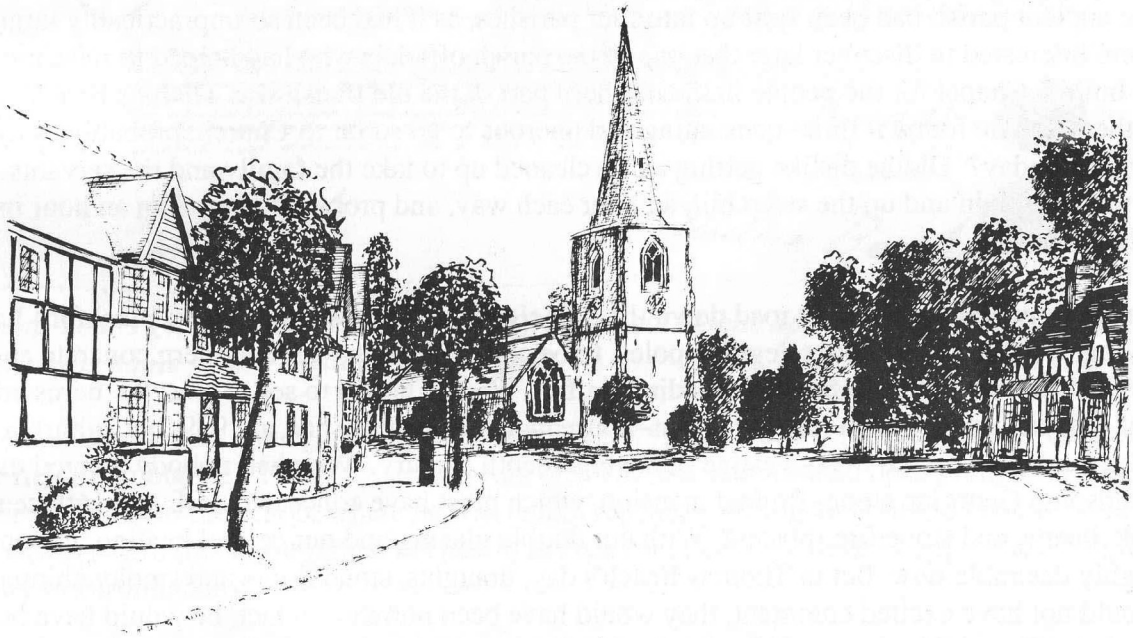
Thomas Beach Part 1

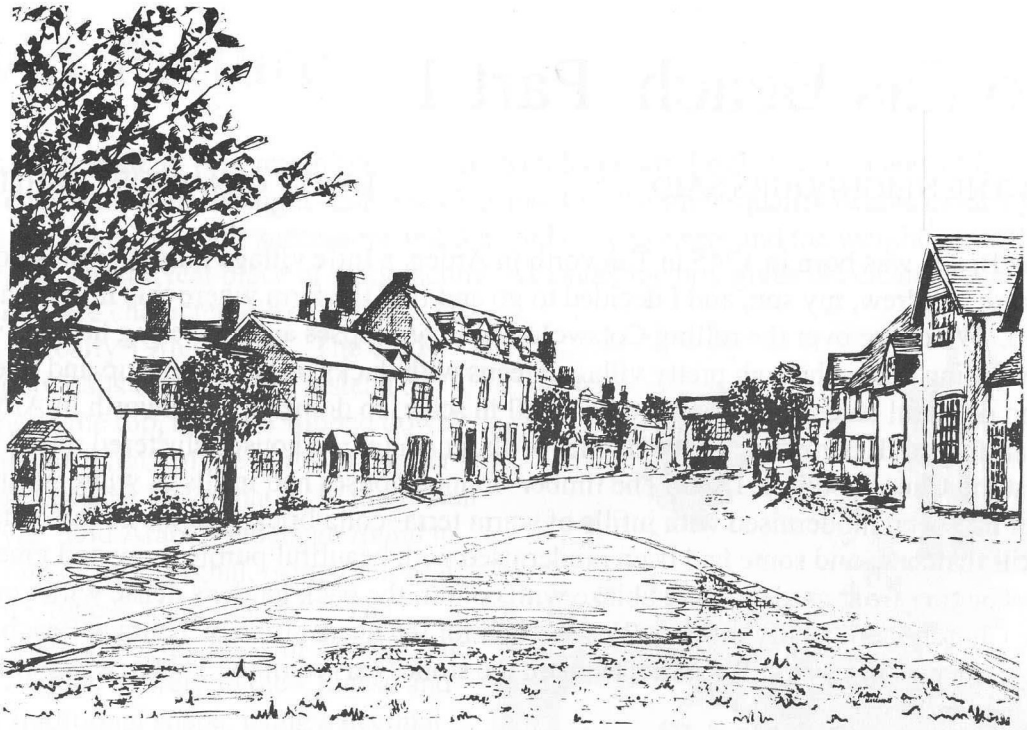
WHAT THE NEIGHBOURS SAID BY D F CRAWFORTH-HITCHINS

Thomas Beach was born in 1745 in Tanworth in Arden, a little village only 40 miles north west of Oxford. Andrew, my son, and I decided to go and find the farm where this important man grew up. We drove over the rolling Cotswold hills, past copses and flowering hedges, we crept round winding lanes, through pretty village greens with ducks on the ponds, up and over the lush and peaceful landscape, so fertile, so small in scale, so domestic. Tanworth in Arden fitted this charming idyll perfectly, a little hamlet of about a hundred houses clustered round the cream stone Church built in 1330. The timber-framed houses had infills of white plaster over laths, or had been modernised with infills of warm terra-cotta bricks. Some of the cottages were still thatched, and some had been modernised with beautiful purple, grey and green Welsh slates. The tiny front gardens were ablaze with colour, the back gardens dense with vegetables, and the Church-yard neatly mown. We searched for the head-stone of Thomas Beach, but although the carving was still legible, even on the stones carved in the 1600s, we could not find any of his family.



Enquiries at the vicarage and at the Post Office changed our depression to hope. Pointing over the brow of the hill, the vicar pointed out that the parish used to extend six miles to the north, across the flat plain to the outskirts of modern Birmingham. The plain was featureless, covered with dreary-looking farms with few trees, and only the winding river and the straight drainage ditches to force any shape onto the fields. Being low-lying, the fields were moist and fertile, but the misty conditions looked conducive to rheumatism.

The lady at the Post Office searched the post-code lists and found Blackford Lane way to the north of the modern parish, out of sight across the plain towards Birmingham. She told us that



the ancient parish had been split up into four parishes, as it had been so impracticably large. We were interested to discover later that one of the parish officials who had helped to raise money to build a Chapel for the people in the northern part of the old parish was Thomas Beach's father. Had he found it time-consuming and onerous to go so far to Church, probably twice every Sunday? Did he dislike getting a cart cleaned up to take the family and the servants across the plain and up the steep hill, an hour each way, and probably more than an hour in Church?

So we travelled the winding road down the hill, zigzagged across the fields to Blackford Lane, trying to picture it without telegraph poles, to be confronted by a huge modern concrete and glass structure, traffic lights and speeding traffic. We had hoped to see at least the barns and out-houses, even though the large farm-house had been demolished in 1939, but suburbia and civic pride had erased every vestige of the eighteenth century. Why had nobody wanted the handsome Georgian stone-fronted mansion, which must have concealed 15th and 16th century oak beams and stone fire-places? With our double glazing and our central heating, it would be highly desirable **now**, but in Thomas Beach's day, draughts, stone floors and smoky chimneys would not have excited comment, they would have been normal. In fact, he would have been envied. His neighbours would have talked.. What might they have said to each other? Let us go back to 1745.

The master's wife's had another baby. That's six living. Calling this one Thomas.

William Beach and his wife had six living babies in twelve years, which was unusual then. A couple could only expect to have two living babies in a whole marriage. Of course, William's wife had the advantage of security, good food and help in the house. In 1759, the neighbours might have said

This Indenture Witnesseth That Thomas Beach son of William Beach of the [illegible] in the County of Warwick doth put himself Apprentice to Robert French of Birmingham in the County of Warwick aforesaid [illegible] to learn his Art and with him after the manner of an Apprentice to serve from the day of the date hereof unto the full end and Term of Seven Years from thence next ensuing and fully to be compleat and ended during which Term the said Apprentice his Master faithfully shall and well serve, his Secrets keep, his lawful Commands every where gladly do. He shall do no Damage to his said Master nor see it to be done of others, but to his Power shall let or forthwith give Notice to his said Master of the same. The Goods of his said Master he shall not waste, nor the same without Licence of him to any give or lend. Hurt to his said Master he shall not do, cause, or procure to be done. He shall neither buy nor sell without his Master's Licence. Taverns, Inns, or Ale-houses he shall not haunt. At Cards, Dice, Tables, or any other unlawful Game he shall not play, nor from the Service of his said Master Day nor Night absent himself, but in all Things as an honest and faithful Apprentice shall and will demean and behave himself toward his said Master and all his during all the said Term. And the said Master for and in consideration of the sum of Ten pounds of Good & lawful Money of Great Britain in hand paid by the said William Beach [illegible] the said Apprentice in the Art of [illegible] which he now useth shall teach and instruct or cause to be taught and instructed the best Way and Manner that he can, finding and allowing unto his said Apprentice sufficient Meat, Drink, Washing, Lodging and all other Necessaries during the said Term [illegible] Apparel [illegible] the said William Beach doth hereby promise to find and provide during the said Term

And for the true Performance of all and every the Covenants and Agreements aforesaid, either of the said Parties bindeth himself firmly by these Presents. In Witness whereof, the Parties abovesaid to these Indentures interchangeably have set their Hands and Seals the Twenty fourth Day of May in the Thirty Second Year of the Reign of our Sovereign Lord George the Second by the Grace of God of Great Britain, France and Ireland, King, Defender of the Faith. And in the Year of our Lord 1759

A Penny
P^r. Pain

N.B. What Money or other Thing is given or contracted for with the Apprentice, must be inserted in Words at length, and the Duty paid within the Time limited to the Stamp Office, else the Indenture will be void, the Master forfeit fifty Pounds and another Penalty, and the Apprentice be disabled to follow the Trade or be made Free [illegible]. The Office is No. [illegible] in Lincoln's Inn New Square, London; and the Office Hours are from Nine to Twelve in the Morning, and from Two to Five in the Afternoon. Holy-days excepted.

Sealed and delivered in the presence of

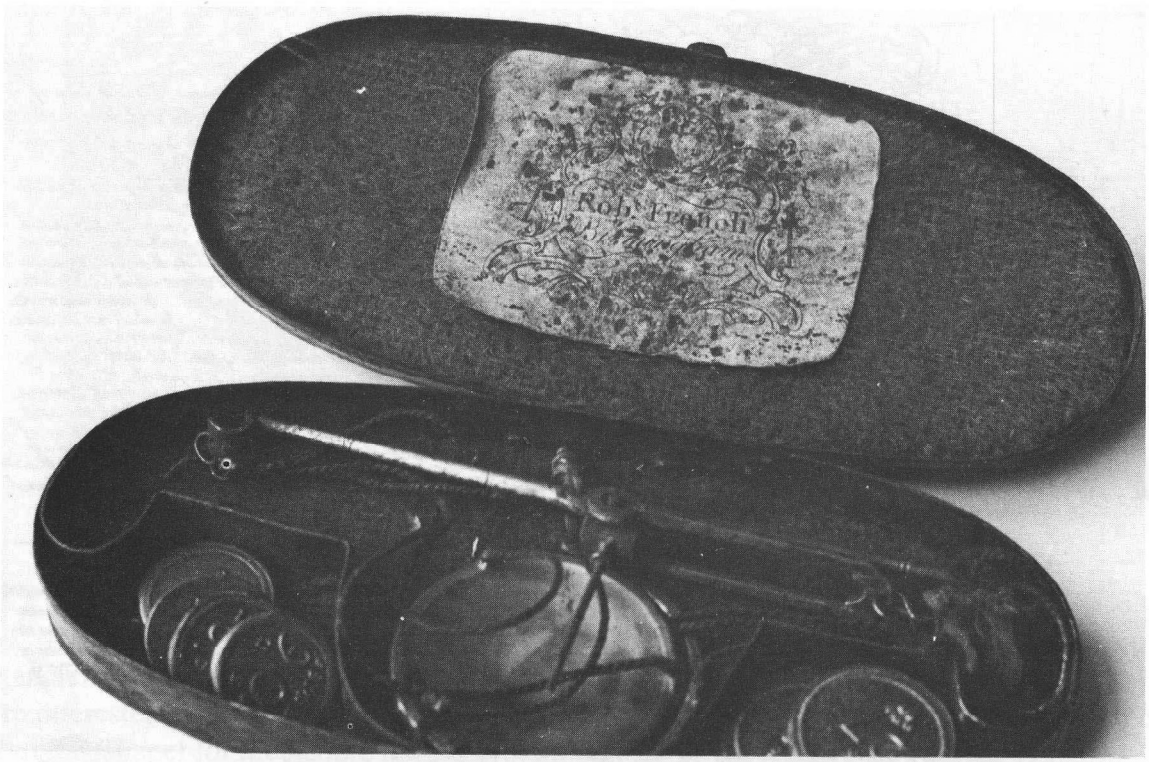
George Beach
John Cottrell

Thomas Beach
William Beach

Young Tom's getting quite a lad. Finished with school. Gone apprentice to Birmingham. Signed his name proper. Quite the little gent.

Thomas Beach must have generated considerable envy. Most of the local children were out in the fields earning their living by seven years old, whereas Thomas had been going four miles over the fields to the school where he was taught reading , writing and book-keeping. And now he was going to the bright lights, not *just* to learn a trade, but to be legally apprenticed, a great rarity in Birmingham.

Robert French, Thomas's new master, was, later in his life, recorded as a scalemaker and stilliard maker, but in 1759, we know nothing of his activities. He must have been a trained maker, belonging to a guild, or he would not have been permitted to take an apprentice. Only two scales by him are known, each a coin scale in an oval japanned box, with a sinuous metal strip forming two large weight pens, sufficient to take the eleven coins current in England in the 1750s and 1760s. The trade cards showed his probable shop sign, a Hand and Scales, and two indistinct steelyards among the foliage. The scale beams were entirely conventional swan-neck end beams, with copper pans rubbed with silver.



On the indenture, Robert French was described as a stilliard maker of Birmingham, and for the sum of ten pounds, was willing to train Thomas Beach for seven years. The contract was witnessed by Thomas himself, his father William Beach, his elder brother George Beach and his mother's brother, John Cottrell, on the 24th May 1759.

Birmingham was a relatively small town when Thomas Beach went there, of about 25,000 people, but it must have been an inferno of smells, heat and noise. The town had the great advantage of being on a dry ridge under which water seeped, giving a multitude of springs running into a small river. These springs ran all the year round, and could be relied on to power the trip–hammers, the grinding stones and the honing stones used by the blade and bayonet makers, the gunsmiths and the braziers, the metal–casters of candlesticks, bells and smoothing irons, the tyresmiths, the lorrimers making bits and stirrups, the wire–drawers and the huge number of little workshops making nails for much of England. By 1760

So that brat Tom thinks it's noisy here. What does he expect? Shape metal by breathing on it?

There was the country boy, Thomas, living beside the main road into Birmingham, with coaches and live–stock coming up the road from London, Stratford–on–Avon, Warwick and Oxford. He was living within ear–shot of the main stream supplying power to the tilt–hammers, blade mills, slitting–mills and the boring–mills. Because the population of Birmingham was increasing so rapidly, every little metal works competed for water–power, coal, sand and charcoal. Grain and animals were brought in on foot or in carts to feed the busy workmen;– and that word 'workmen' covered virtually every pair of hands over the age of

seven. A man wrote to his family that 'the locals stank of train oil and emery, having complexions composed of oil and dust, smoke-dried, and many were red-eyed and green haired.' (The latter was due to hot furnaces and brass working.) By 1762

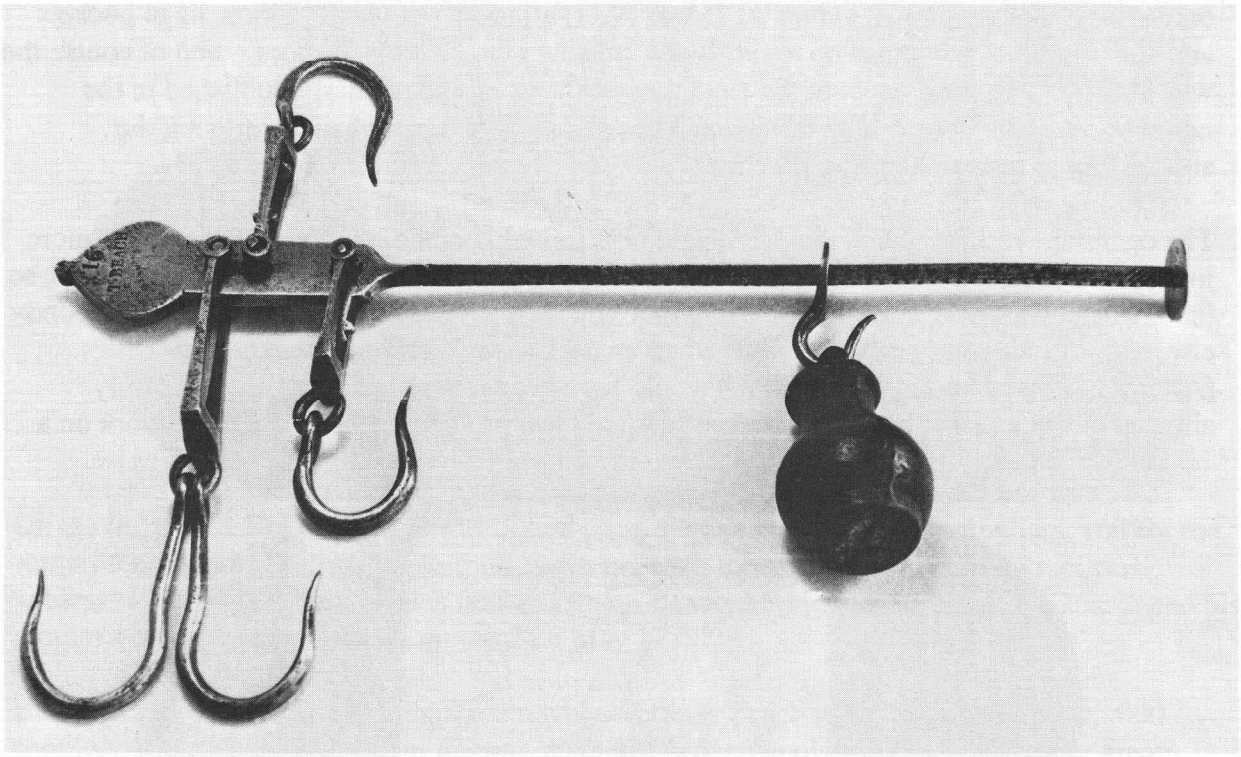
That snotty apprentice Tom Beach, with all his airs and graces. A wig- and him not shaving yet. And only learning one job. Lucky brat.

Apprentices wore similar clothes to their masters,- white shirt with full sleeves, woollen knee-breeches, cream and brown velvet waistcoat, (vest) a 'jacket' with heavy skirts, huge pockets and silver buttons, stockings up to the knees and silver buckled black shoes,- and of course the wig for best. Information about the clothes of apprentices was regularly published in the newspapers of the day, as irate masters published details of dress when advertising the absconding of their unhappy apprentices.

The common workmen were very well paid in Birmingham, because there were always more jobs than skilled men to do the jobs. Most men could turn their hands to at least two trades, so that , when times were slack in one trade, they could cross the landing and work for somebody else, and if times were busy, they worked seven days a week, and counted their blessings. (After all, if they lived in London, they would have been controlled by a Guild and only allowed to work at one trade, and even when trade was prospering, they could not work on a

Sunday and save up for the lean times in London.) But, naturally, the neighbours envied a boy who could rely on work in only one trade, making a good income without fear of being laid-off, who was clean enough to wear smart clothes, and who was not 'red-eyed and green-haired.' By 1766

I hear that Thomas is off back to the countryside. That'll be nice for his ears and lungs. Wish I had a father who could set me up with a workshop.



Thomas completed his apprenticeship in the normal seven years, and Robert French swore to his competence to be a stilliard maker. The workmen in Birmingham would have felt ambivalent about his return to the countryside. Yes, he would get fresh air, fresh food and quietness, but he would loose stimulation, company, variety and customers. Thomas's father set up an anvil and a hearth in a barn at the back of the farmhouse, but he had to get the stilliards to his customers, now that he was seven miles out of Birmingham. Sold them to Robert French? Sold to a warehouse? Sold by a pedlar? Sold at the farm gate? Certainly he would have found it easier to sell his wares away from London, as London had so many stilliard makers working there. About 1770

Thomas marrying Elizabeth Gill? Lovely. Bet they have lots of healthy babies. He's one of seven. His dad's one of six, and his sister's got sixteen.

The Beaches moved four miles nearer Birmingham, to Sparkhill, a slum now, but then a pretty village. We do not know where he worked, but we do know that they only had one daughter. She would have known her sixteen cousins as they lived near the farm. Thomas's sister had

married her father's clerk, (yes, it was a big farm business,) a man called John Avery, and their grandchildren became important forty years later..... In 1777

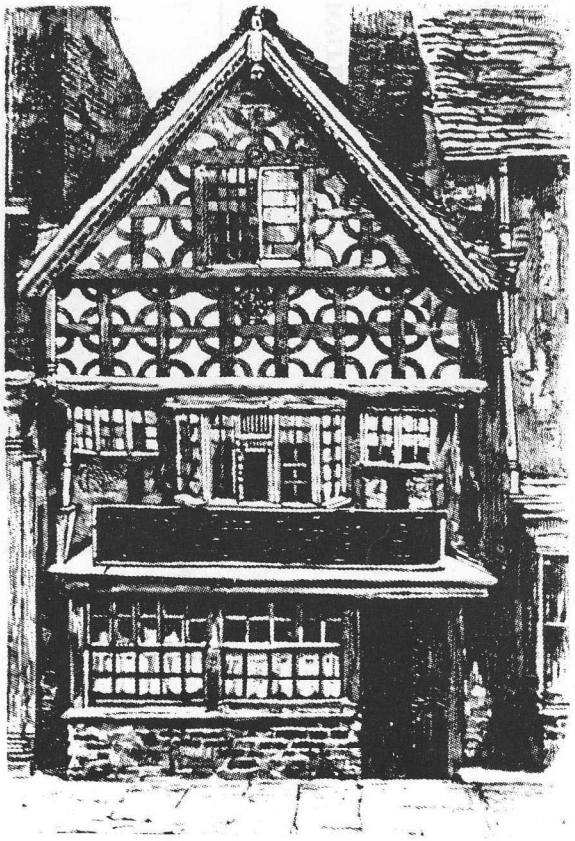
Mr. Beach has a good spot for his shop. Nearer the town centre than old Robert French. But the Bullring's only at the top of Digbeth so he can nip down for a chat any time. Got a yard at the back for his forge. Perfect.

Thomas had only to walk from his village of Sparkhill, across two or three fields, down the hill past houses with fields at the back of them, over the ford, (the bridge was in danger of collapsing, and was only used for goods that it was essential to keep dry,) up Digbeth past the five stilliard-makers shops and he would be in his shop within the hour. Now he could sell direct to his customers, and he would get his raw materials more easily, (iron and coal both coming across Birmingham from the north-west.) By 1782

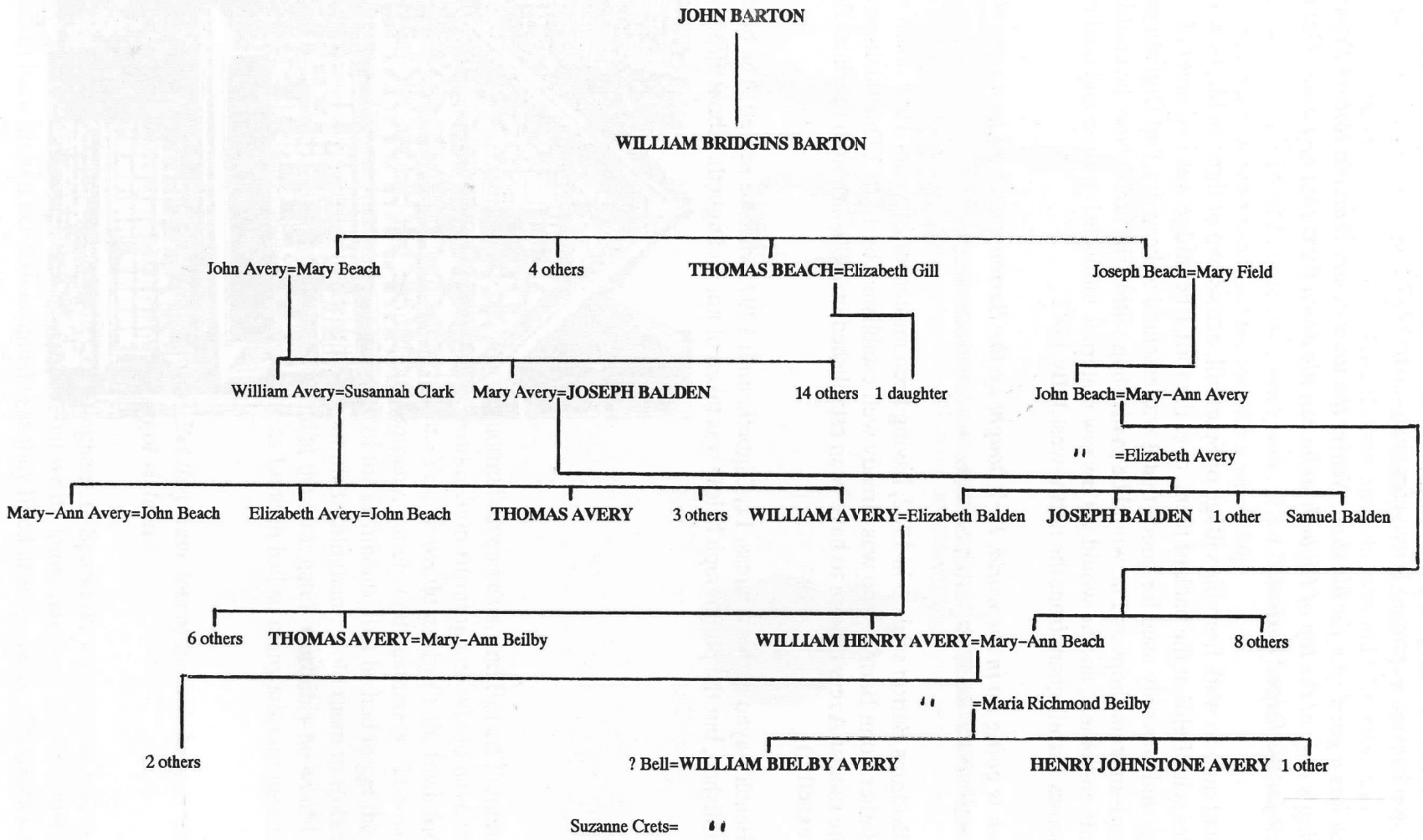
Mr. Beach is going up in the world. He's bought up the Barton's stilliard business. He must be doing well.

William Bridgins Barton sold up in 1782, having been master for 21 years. He'd taken over from his father, John Barton, who was already well established by 1728. (This business seems to be at the root of Avery's claim to have been established in 1730, although the dates don't coincide exactly.)

Thomas Beach stayed at this address, 11, Digbeth, until 1797, when he retired. The house has been demolished, but the photograph below was taken of no. 15 Digbeth. About 1785



Ownership of the Business



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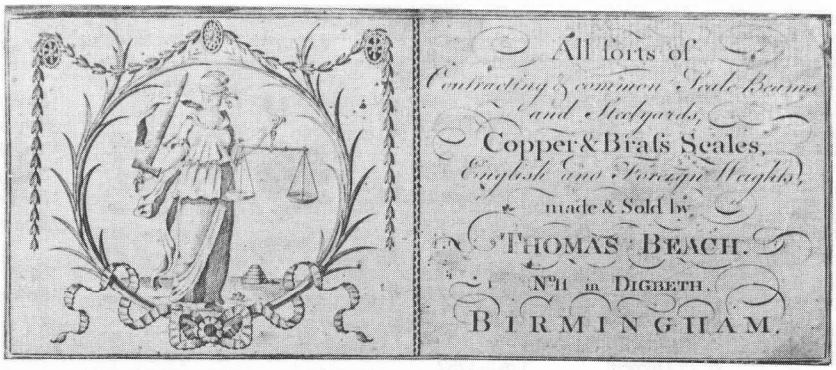
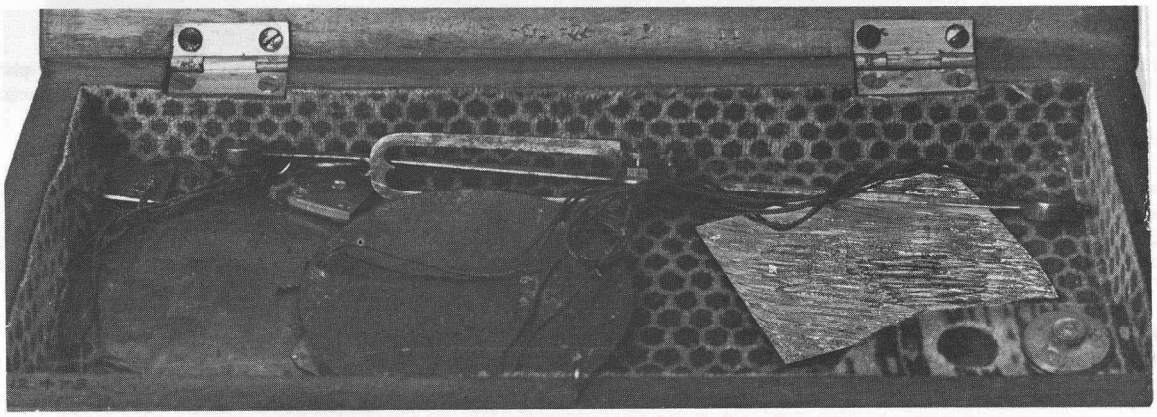


Mr Beach is getting more and more Londonish. He's got himself a trade card, no less. Very grand.

If Thomas Beach had been a Londoner, he would have illustrated his shop sign in the middle of his trade card, to remind people what to look for when trying to find his shop. So was "The Justice and Scales" his shop sign?

"Contracting beams" are described later in this article. "Copper and brass scales" referred to scale–pans of the most luxurious metals, as copper and zinc were such expensive commodities. "English and Foreign weights" were coin weights for all the gold coins circulating in Britain at that time.

The very fact that he had a trade card printed indicated that he made scales other than stilliards. After all, he didn't need trade cards to stick on stilliards, but he did need them for his boxed sets of coin and apothecary scales. About 1785



Mr Beach is certainly hitting his competitors. He's making more and more coin scales. What next?

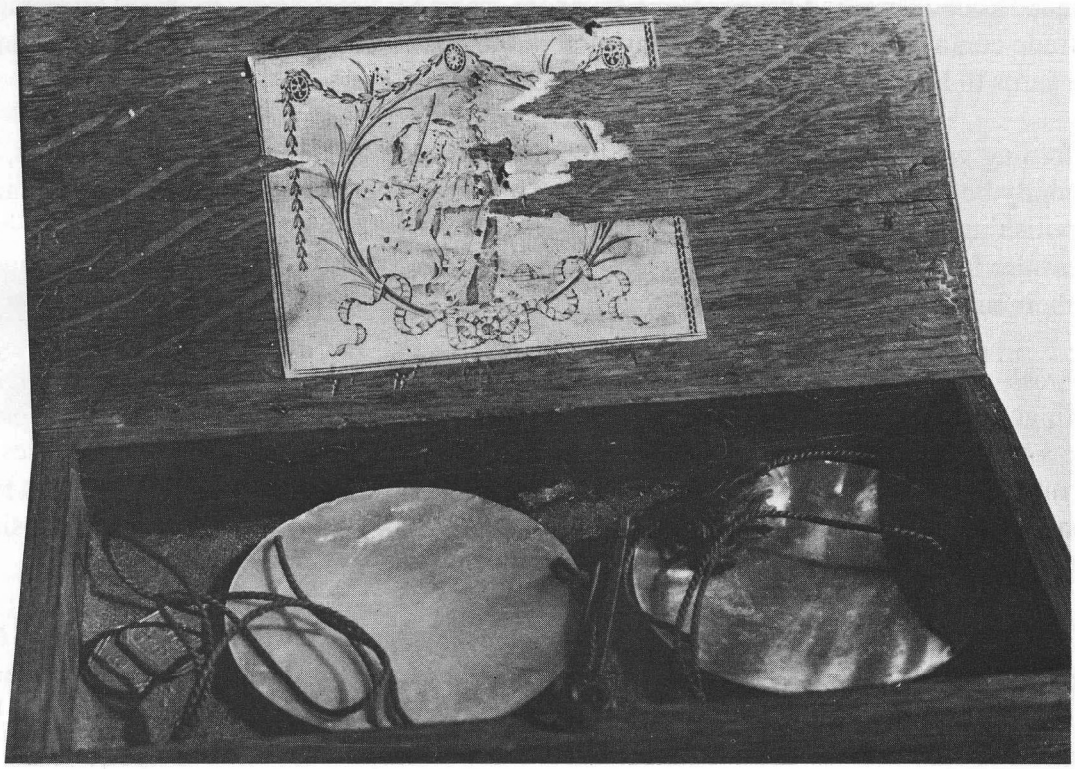
Thomas Beach made various coin scales, with swan or box end beams, in mahogany or oak boxes, with proper flap hinges or crude wire hinges, often lined with brown and cream velvet as was the tradition in Birmingham.

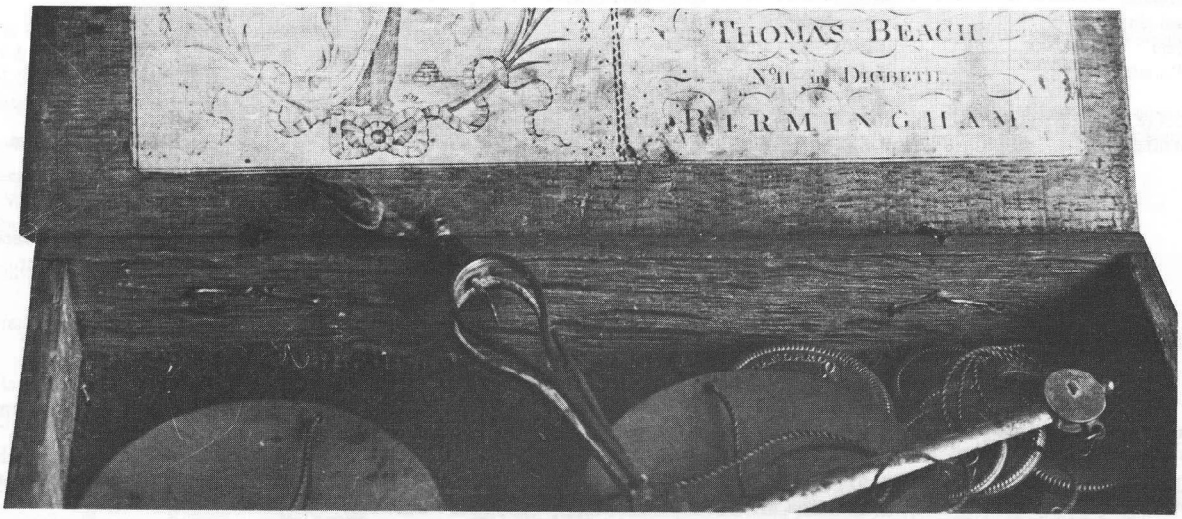
BIRMINGHAM SCALEMAKERS 1750–1800

MAKER	TOWN	DATES	SURVIVING WORK	STATED TRADE
AMOS John & PARKES William	Bilston	1774	Guinea sc	Sc & Wts for Gold Weighing
ANDERTON & CALLEY	B.	1791–1808		Toy m. Math. Inst. m.
ANDERTON, SON & CALLEY	B.	1783	Port. piece wts	Toy m.
BALDEN Joseph Snr	B, Moat Row	pre1791–1797	Advert. Folding guinea bal.	Sc & steelyard m. , Screw stock, copper
	B, 11, Digbeth	1797–died 1813		& money sc. Gold machine m. Brass & Iron wts.
BALDEN Joseph Jnr	B, 11, Digbeth	1813–1816		
BALDEN & WHITFIELD	B,	1785–1788		Sc m.
BARTON John	B, Digbeth	c. 1720–1746		Stilliard m.
	B, 11, Digbeth	1746–died 1761		
BARTON William Bridgins	B. Digbeth	1744		Steelyard m.
	B. 11 Digbeth	1761–1782		
BEACH Thomas	Tanworth	1766–pre1777	Apoth sc, coin sc, folding	Sc beam, steelyard, screw
	B. Bull Ring	pre1777–1782	guinea bal, 8–26 inch steelyards,	plate, money sc m.
	B. 11 Digbeth	1782–1797	trade sc, inspectors bal. Catalogue	
BERRY	B.	c. 1760	Port. piece wts	
BLEWS William	B.	1782–1835	Sovereign rockers,	Button, brass candlestick, weight m. brass founder, gilding, plating metal, mould turners.
BOURNE Thomas,	B. Broad St	1778	Iron wt. Catalogue.	Sc, steelyards, weighing machines
	B. Digbeth	pre1791–1793		screw plates, die stocks
	B. Broad St,	1833–1845		
CADWICK	Dudley	c.1745		Weighbridge m.
DAVIES Joseph	B. Henrietta St	1787–1829,		Sc, money machine m., jobbing smith
	B. Water Lane	1788		
	B. 76 Park St.	1791–1801		
	B. Hamilton St,	1822		
DAVIS John	Bilston	1793,		Money sc , toy m.
DEVEY John	Bilston	1793		Brass barrel corkscrews, pocket steelyards
FIELD Thomas	B. 63 Digbeth	1770–1775	Steelyard.	Stilliard m.
	B. 58 Deritend	1777–1781		
FORD	B.	c1760	Port. piece wts.	
FORD Richard	B. 27 Little Charles St.	1767	Hydrostatic coin sc. Patent 935,	Engine & lathe m., blacksmith Patent sc m.
FORD, WHITMORE & BRUNTON	B. 27 Little Charles St	1771–1798	Trade card, Catalogue.	Blacksmiths, weighing machine m.
FRENCH Robert	B. 35 Digbeth	pre1759–1776	Coin sc	Sc & steelyard m.
	B. 28 Digbeth	1770–1777		
HARRISON James	B.	c.1760	Port piece wts	
HAY (HAYES) James	Wolverhampton	1767–1802		Stilliard, sc & screwplate m.
HUNT Basil	B. 48 Edmund St	1767–1781	Coin sc	Roller & plater of metal, caster & cooper blank m.
JACKSON James	B. High St	1750	Hydrostatic coin bal.	Jeweller at toy shop
	B. 30 High St	1767–1785		Master at Assay Office
JONES Edward	Wolverhampton	1792		Sc m.
KEYS James	Wolverhampton	1792		Sc beam m.
LINGARD George	B. 15 High St	1767–1770		Stilliard, screwplates, sc m.
LOWE Thomas	Bilston	1780–1784		Lock & pocket steelyard m.
LOW (LOWE) Thomas, Jnr.	Bilston	1793		Pocket steelyard m.
MARSTON John	Wolverhampton	1792		Sc m.
MOUNTFORD	B. Russell St	1785–1788	Folding guinea bal.	Candlestick & sc m.
MOUNTFORD Humphrey (Henry)	B.Coleshill St	1791–1805		Sc, brass & other metal wts & bell m.
	B. 37 Lancaster St	1797–1807		Money sc m.
MOUNTFORD I	B. ?	c.1790	Folding guinea bal	
MOUNTFORD W	B. ?	1767–1781 ?	Folding guinea bal	Brass candlestick m.
NICKLIN Edward	B. Snow Hill	1793		Wire worker & money sc m.
OWEN	B.		Port piece wt	
OWEN Gibbs	B. 37 Digbeth	1767–1775		Stilliard m .
OWEN Hannah	B. 37 Digbeth	1777		Sc m.
ROBINSON Jonathan	B. Birchall St	1791–1797	Steelyard	Sc & steelyard m.
	B. Slitting Mill Lane	1793		
	B. Lower Mill Lane	1801–1842		
ROBINSON & Co	B. Slitting Mill Lane	1785–1788		Sc, steelyard, screwplate m. Slitting mill.
ROGERS Benjamin	Wolverhampton	1792–1802		Sc beam m.

SALTER George Snr.	West Bromwich	1791–died 1849	Patent.	Spring bal, pocket steelyard, vertical roasting jack, musket & bayonet m.
SALTER Richard	Bilston West Bromwich	1760–died 1791	Compression spring bal	Springs, pocket steelyard , roasting jack & bayonet m.
SALTER William	Bilston	1760–died 1822		Pocket steelyard m.
STOKES Saul (Samuel)	Wolverhampton	1792		Steelyard m.
TAYLOR John	Bilston	1780–1793		Pocket steelyard m.
TAYLOR William	B. 48 High St	1793–1816	Sovereign rockers	Brazier & tinman
	B. 9 Princes St	1850		
TOMLINSON & BICKLEY (T & B)	B. Moor St	1797–1812	Folding guinea bal, coin sc	Factors
TONGUE William (W.T.)	B. 43 Snow Hill	1767–1781	Port piece wts, coin sc	Gun lock m. Money sc m.
	B. Livery St	1793		Gilt toy m.
	B. Weaman St	1797–1812		
	B. Keay St	1812	Advertisement	
	B. Bordesley St	1816–1817		Steel chain, toy & ornament m. Jeweller, factor & plater
	B. 22 High St	1816–1822		Engineer & toy m.
	B. 20 High St	1825		Silversmith
WARD Callingwood (C.W.)	B. 10 Newton St	1785–1787	Folding guinea bal. Coin wts	Sc beam m. & victualler
	B. Steelhouse Lane	1788–1793		
	B. Summer Lane	1797		Money sc, bal, gilt & steel toy m.
	B. 16 Moland St	1816–1818		Woodscrew & gun implement m.
WAREN (WARREN) Joseph (John)	B. 2 Weaman St	1780–1801	Folding guinea bal	Sc m. & victualler
	B. 15 Steelhouse Lane	1793–1801		Money sc & dealer in coals
WESTWOOD John & Obediah	B. 37 New Hall St	pre1762–1777	Coin sc. Port piece wts.	Die sinkers & coffinplate furniture m.
	B. 21 Great Charles St	1777–1781	Guinea wts . Patents	
WHITFIELD (WHITEFIELD) Edward	B. 16 Church Lane	1777–1829		Sc beam, steelyard, copper sc,& spoon m
WHITMORE William	B. 112 Snow Hill	1777		Toy m.
	B. 27 Little Charles St	1780–1793	Advertisement	Sc, sc beam, steelyard, machines for weighing wagons, etc
	B. Newhall St	1797–1803	Advertisement. Patent	Jobbing smith, Wt m. etc
WHITWORTH & YATES	B.	1780	Port piece wts. Document	
WOOD Joseph	Wolverhampton	1792		Steelyard m.
WYATT John	B.	1700–died1766	Machines for weighing wagons	

Note– B.= Birmingham, Sc= scales, Wts= weights, m.= maker, Port= Portuguese, 1767= first Birmingham trade directory, containing names of many mature men, who probably worked for many years prior to that date, 1792= first rate book for Wolverhampton examined for trades, again containing names of many mature men , who probably worked for many years prior to that date.





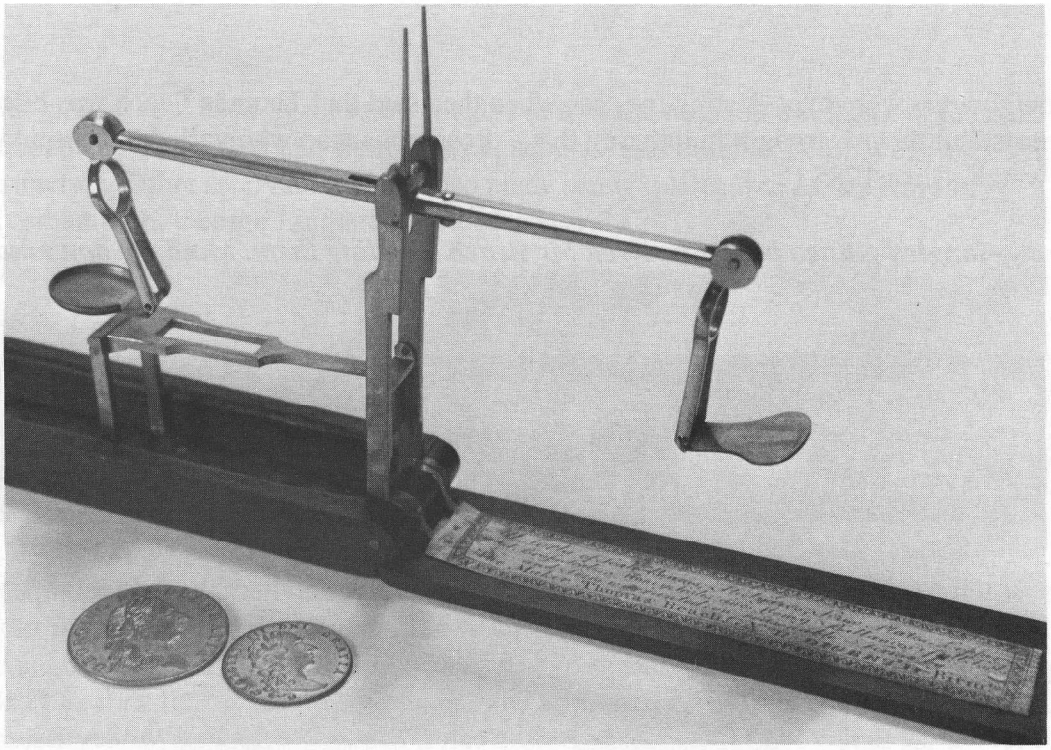
The competitors fell into several categories. There were the traditional stilliard–makers, who have left little evidence of their skills, partly because few stilliards have survived from the 18th century (being of no value after the 1906 Act made it illegal to use steelyards which did not zero,) and partly because few makers stamped their name into the steel, as Thomas Beach did, so it is difficult to identify 18th century steelyards. They must have felt the competition from Thomas Beach very keenly.

Another category was the coin scale makers, who did not fear a jumped–up stilliard–maker like Thomas Beach. They had been making fine coin scales for years, had very good reputations, had trade contacts with London and have left numerous examples of fine workmanship, with trade cards to help with identification.

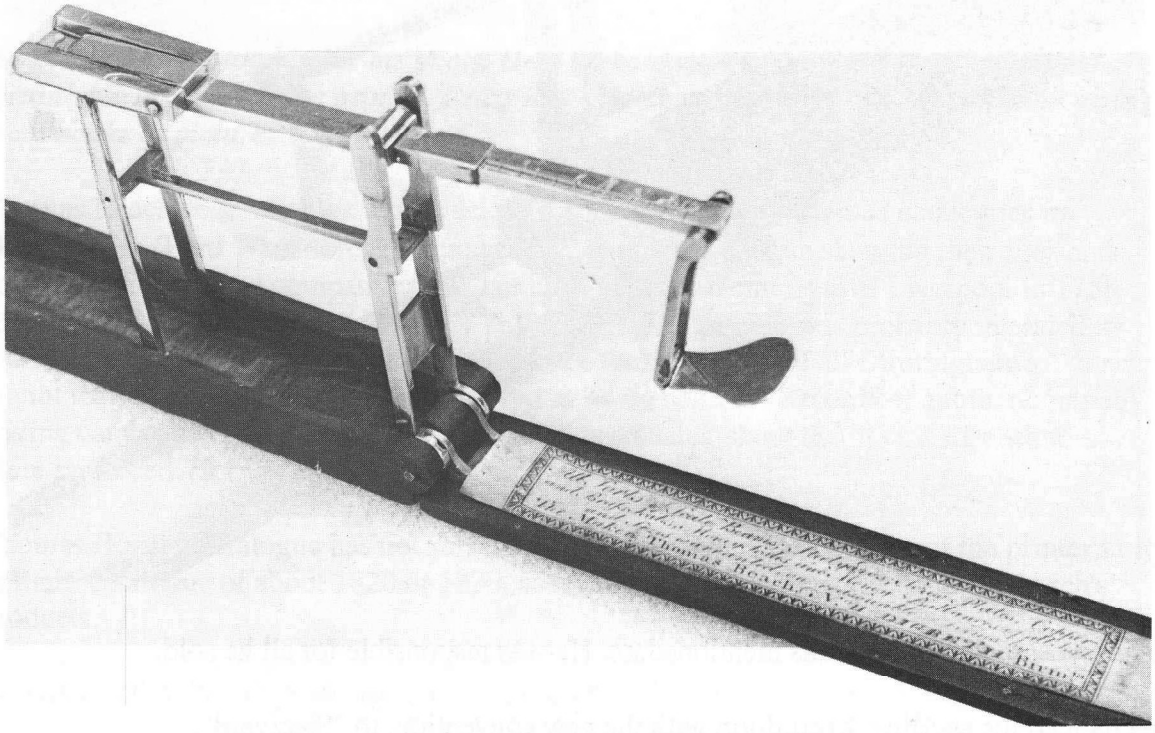
The folding guinea balance makers were another secure group. They had multiple skills, frequently being gun–part makers, casting tiny bits of brass and iron, filing to fine tolerances, and polishing to a high finish. Their products were more in competition with the better–made Lancashire folders (where the skills were those of the watch and clock trade) and Thomas Beach was their customer not their competitor.

The brass casters had the security of working for many trades. Many were big names in Birmingham and are still known for their later works of beautiful golden brass. They must have made a lot of scales, because they mentioned them on trade cards and in trade directories, but they only made the brass parts – the pans, the chains and the hinges – whereas Thomas Beach probably specialised in the iron parts – the beams and the blades – so they must be considered complementary rather than competitive.

The competition with the pocket steelyard–makers must have hurt Thomas Beach more than it hurt them. Their products (spring balances) were so cheap that it was only the (unfounded) fear that the springs would be defective that kept customers buying steelyards and equal arm beams for trade use.

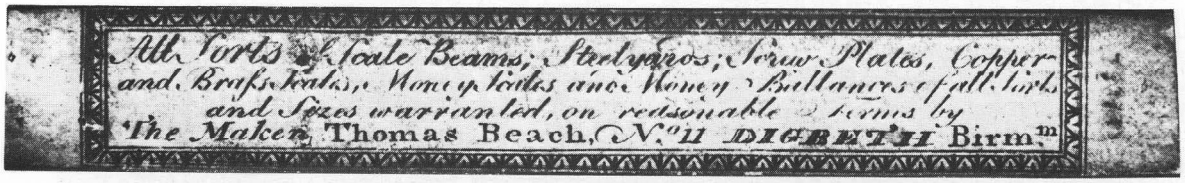


The jewellers and toymakers were another group who must have resented Thomas Beach's moving into their field of small coin–scales, but they had got other skills and were not wholly dependent on scales for their livelihood. They were vulnerable in that their customers only bought when times were prosperous, being sellers of non–essential goods, but their customers would have struggled hard to find the money to buy coin scales whenever they'd been frightened by one of their friends getting a counterfeit coin, or a tax–man refusing to accept light coins that had been clipped.

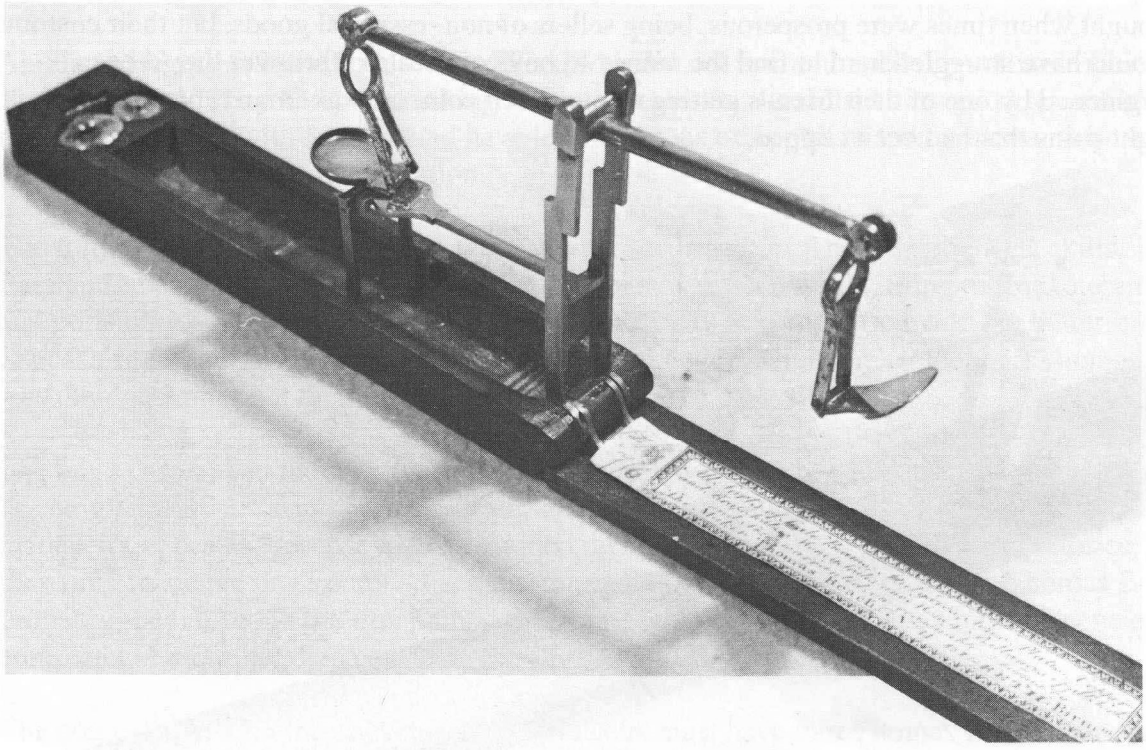


So the neighbours were over-stating the case when they said that Thomas Beach was hitting his competitors, but they were right in thinking that a prosperous man who varied his output was a man to watch. Circa 1785

Them new-fangled guinea balances. Even Mr Beach is selling them. Mind, he don't make 'em.



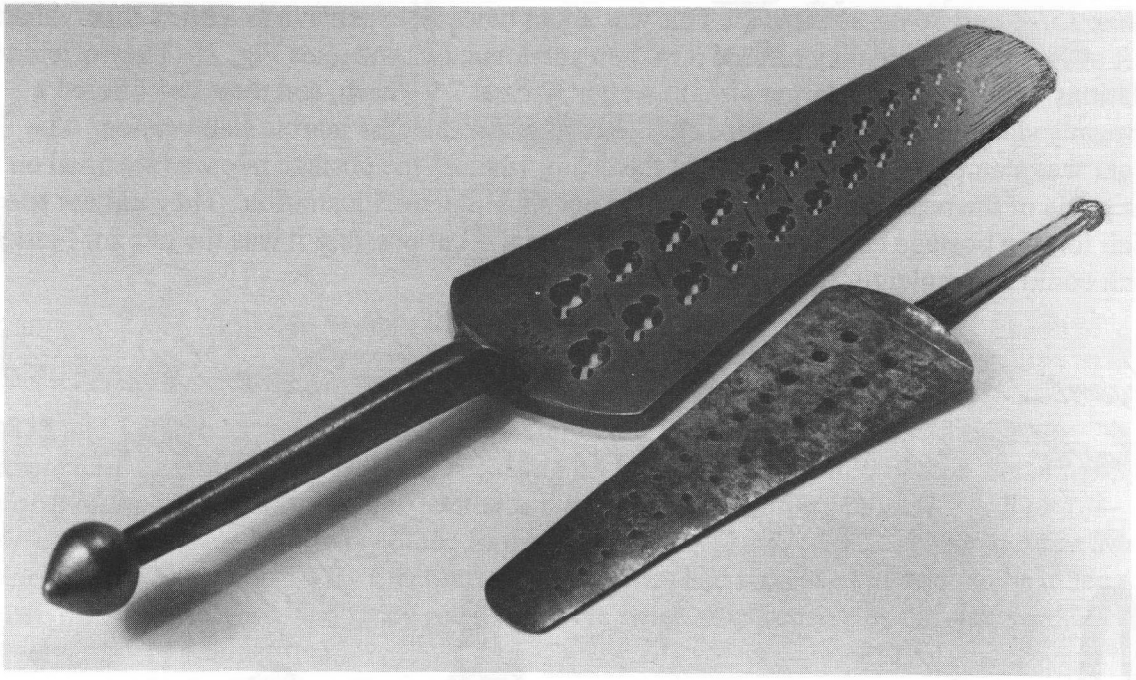
Thomas Beach was buying folders in from Callingwood Ward, another unusually competent craftsman in Birmingham, who had a gun-implement business. Beach also bought in rubbishy Birmingham folders of crude workmanship (which must have lowered his reputation,) and well made Lancashire folders, sticking his own little label in all types, stating "All sorts of Scale Beams, Steelyards, Screw Plates, Copper & Brass Scales, Money Scales and Money Balances of all sorts and sizes warranted on reasonable terms by the Maker, Thomas Beach, No. 11 Digbeth, Birm".



Maker, yes; maker of all items mentioned,no. He **was** responsible for all he sold.

He changed the spelling, to conform with the new convention, to "Steelyard".

Screw–plates were used by all screw makers to turn the ridge on the shank of the nail. They had to be made of the hardest and sharpest iron, accurate and durable, demanding high skill in manufacture. Other steelyard makers also made screw–plates; see James Hays of Wolverhampton, George Lingard and Robinson and Co.



Money scales were equal arm beams, whereas money balances were folding guinea balances and thus steelyards. About 1786

Mr Beach has got too big for his boots. He'll go bankrupt, mark my words. He's spent a fortune having catalogues printed. Crazy idea. He always got orders before without giving them books of pictures.

Thomas Beach certainly took a gamble. Only one company had printed catalogues in Birmingham (Ford Whitmore & Brunton in 1775 had a catalogue showing their files and engines) and only one company in England prior to that, (John Eyre of Liverpool in 1758 showing watch parts and watch tools.) This astonishing gamble was probably intended to increase his trade with far–flung places, (France took a quarter of all Birmingham's manufactured goods before it got embroiled in its revolution.) Records of another company having catalogues printed with illustrations 15 years later, show that it cost £1 each to have them produced, (for Peter Stubs of Warrington.)

Thomas Beach's catalogue has not survived intact, but Avery's used some of the printer's blocks in their catalogue of about 1820 or 1830, so we can find out a lot about Thomas Beach's products.

The second part of this article will appear in the next issue.

Avery Postal Steelyard

BY G & R LIPFERT

In the W & T Avery catalogue of 1850 they show a chunky steelyard postal scale, number 367, (see Fig. 1,) which they describe as an *'Elegant Letter Scale with best Box End, Lever Beam, Brass Fittings, Marble Slab, to weigh in 1/4 oz. for Home & Foreign Postage. 4 oz. size 12/–, 8 oz. size 15/–, and 16 oz. size 18/–'.* This was about twice as expensive as a brass roberval scale, but it obviously sold, as they offered it in their catalogue of 1862 ,(see Fig, 2.) They offered more variations – they offered a larger size, to weigh 32 oz at 24/– each, and they also offered a mahogany slab with English postage only, 20% cheaper than the marble slab version. The weight was stamped on the front side of the beam, whereas the postage rate was stamped on the back oside of the beam, so consequently was not shown in the illustration. They did not specify which foreign postage could be stamped on the beam – but possibly it was the rate for France which could conveniently fit below the English rates.

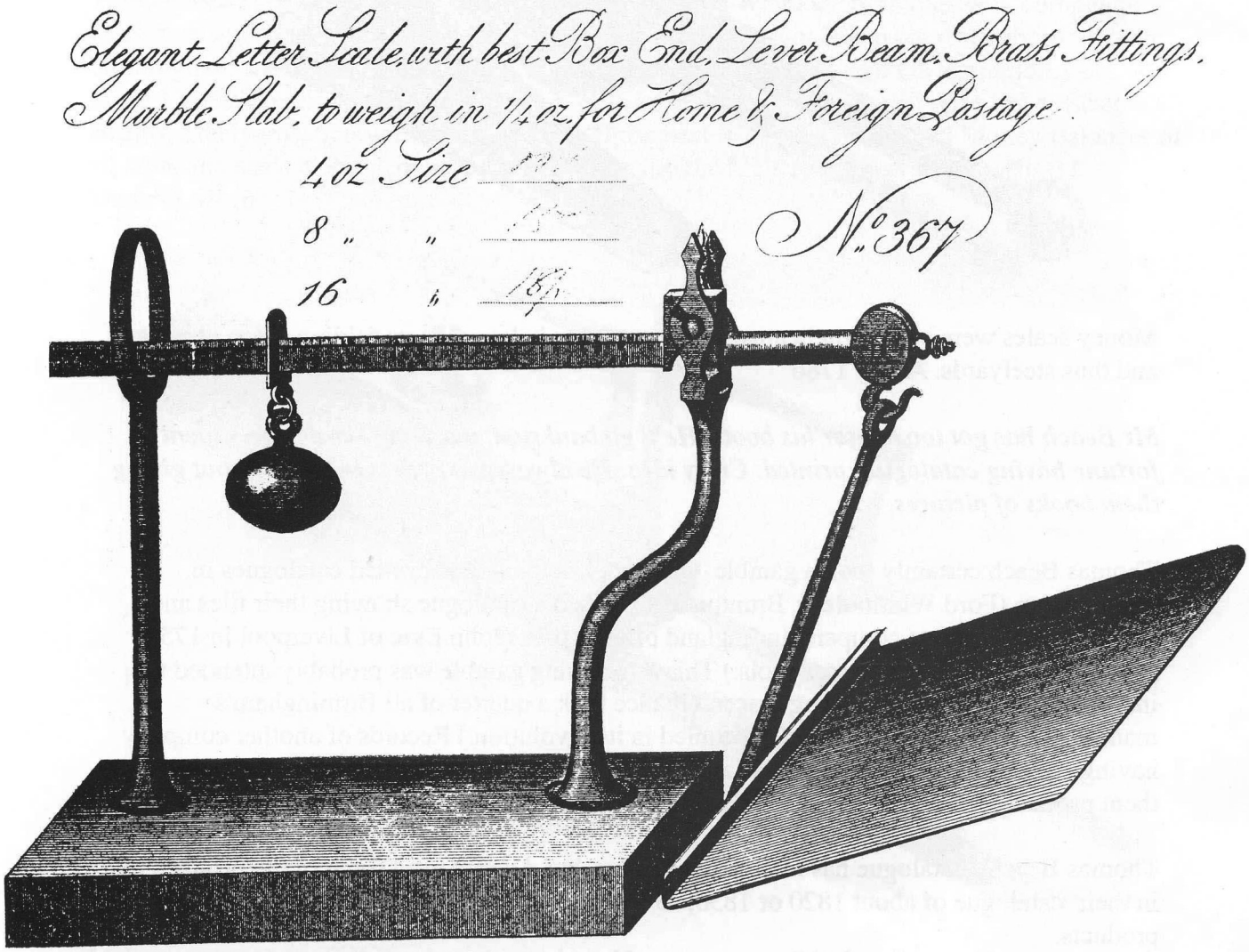
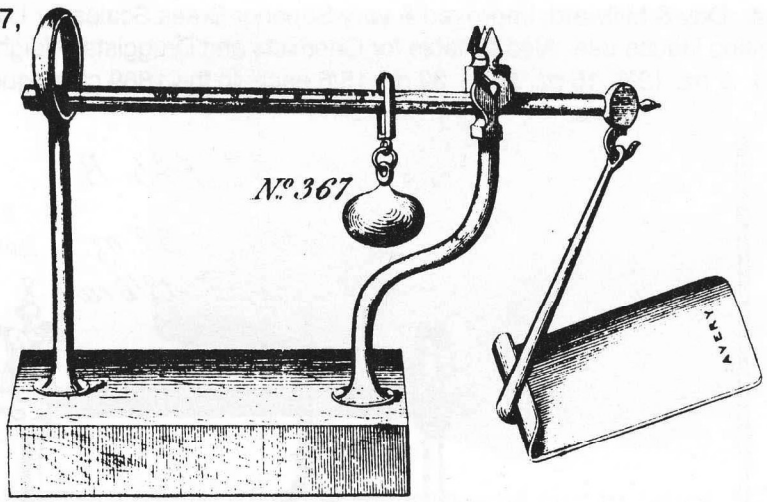


Fig. 1. W & T Avery postal steelyard, in the 1850 catalogue.

Fig. 2 W & T Avery, still number 367, in the 1862 catalogue.

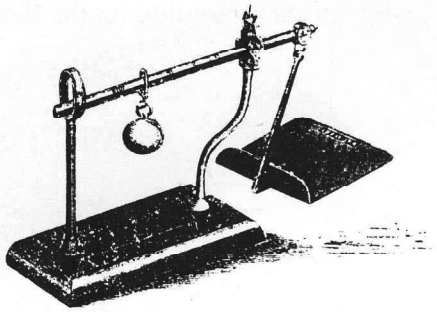


To weigh from ¼ oz to 4 8 16 32 oz
Marble Slabs English & Foreign Postage 12/- 16/- 20/- 24/- Each
Mahogany .. and English Postage only 10/- 13/- 16/- 20/- ..

By 1878 and 1880 the scale still had the same reference number but was described as an *'Accurate and Sensitive letter Balance requiring no loose weights, graduated on Beam to any standard. Mahogany or Marble Slab, Balance made of Brass. To weigh 4 oz 10/–, 8 oz 13/–, 16 oz 16/–, 32 oz 20/– on Mahogany Slab. To weigh 4 oz 12/–, 8 oz 16/–, 16 oz 20/–, 32 oz 24/– on Marble Slab'.* (see Fig. 3.) By this time roberval scales had increased in price to be at least as expensive as the steelyard, and fancy robervals were twice as expensive as the steelyard, making the steelyard very competitive.

W & T. AVERY.

LETTER BALANCES.



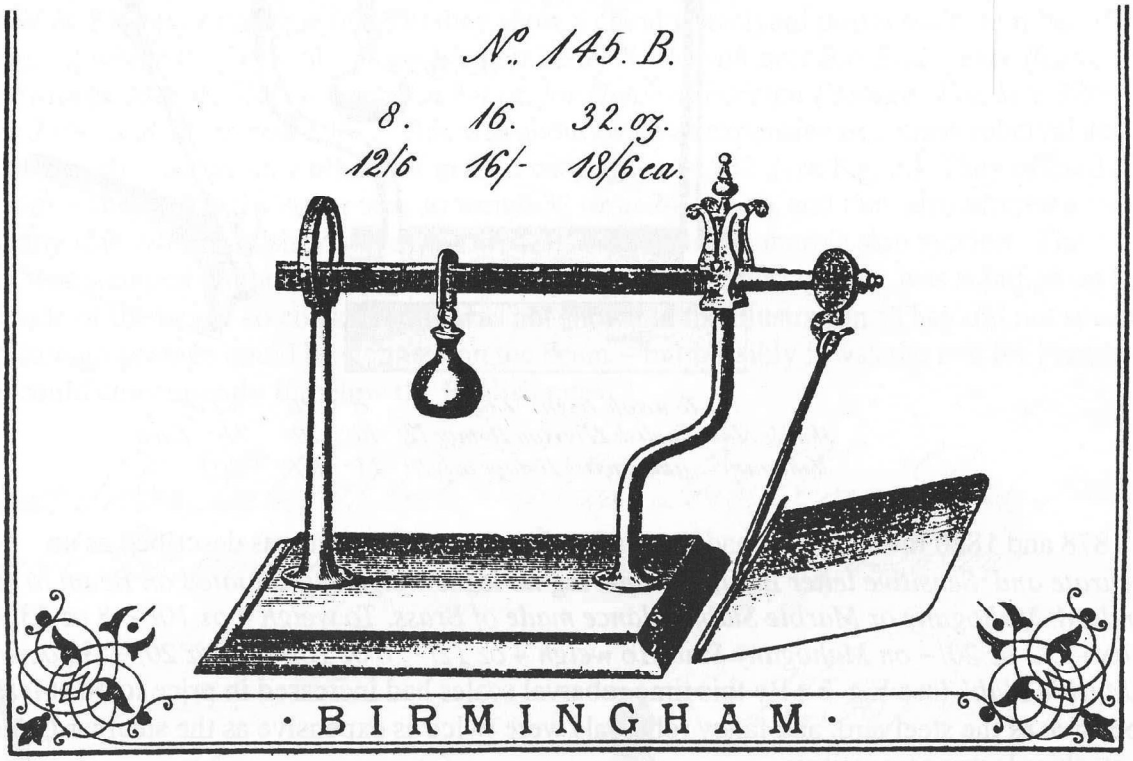
367.—ACCURATE AND SENSITIVE LETTER BALANCE,

Requiring no loose weights, graduated on Beam to any standard, Mahogany or Marble Slab, Balance made of Brass.

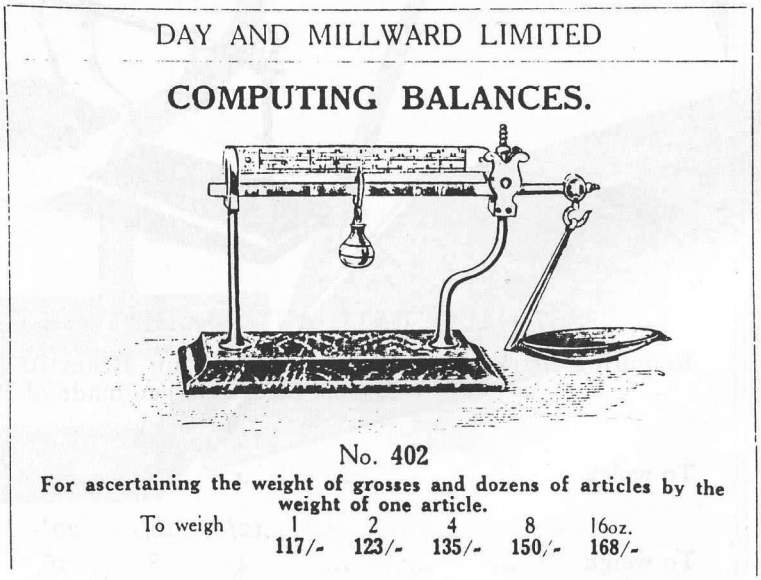
	10/-	13/-	16/-	20/-	
To weigh	4	8	16		32 oz. on Mahogany Slab.
	12/-	16/-	20/-	24/-	
To weigh	4	8	16		32 oz. on Marble Slab.

Fig. 3. W & T Avery, in the 1880 catalogue.

Fig. 4. Day & Millward, Improved & very Superior Brass Scales for Letters, small Parcels, & general Counting House use. Also suitable for Chemists and Druggists. Weights & Scales warranted correct. No. 145B. 8 oz. 12/6, 16 oz. 16/–, 32 oz. 18/6 each. In the 1889 catalogue.



In 1889 Day & Millward were offering the same scales, (see Fig. 4,) with one minute difference;– the shape of the top of the fork, (into which the steelyard slotted,) was curled outwards – and in 1924 they still offered the scales, (see Fig. 5,) but with the added refinement of an index mounted above the blade to which the modified poise pointed. Yet another company, who did not sign their work, sold another variation on the theme, but with a more ornate poise and guard loop, (See Fig. 6.)


DAY AND MILLWARD LIMITED

COMPUTING BALANCES.

No. **402**

For ascertaining the weight of grosses and dozens of articles by the weight of one article.

To weigh	1	2	4	8	16oz.
	117/-	123/-	135/-	150/-	168/-

Fig. 5. Day & Millward Computing balance, In the 1924 catalogue.

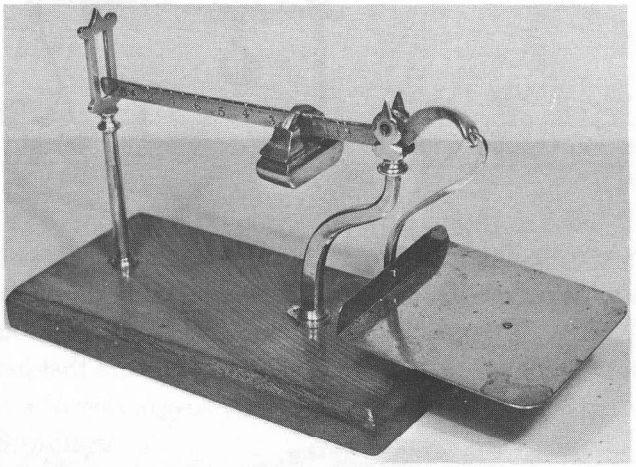


Fig. 6. Anonymous postal steelyard, to weigh 8 oz. No postal rates.

In 1897 the postal rates were reduced to 4 oz. for 1d, which gives a useful clue to dating. The Crawforth's W & T Avery 367 (see Fig. 7,) was made after that change in postal rates but before the next change in 1915. The steelyard was still elegantly made with trumpet shaped bottoms on the pillars, but the guard loop was altered to a graceful oval instead of a plain circle, and the name W & T Avery Lᴅ Makers Birmingham, was stamped into the lovely golden brass of the letter plate. The mahogany base was subtly curved on three sides and cut well back on the fourth side so that the letter plate did not hit the mahogany during use.

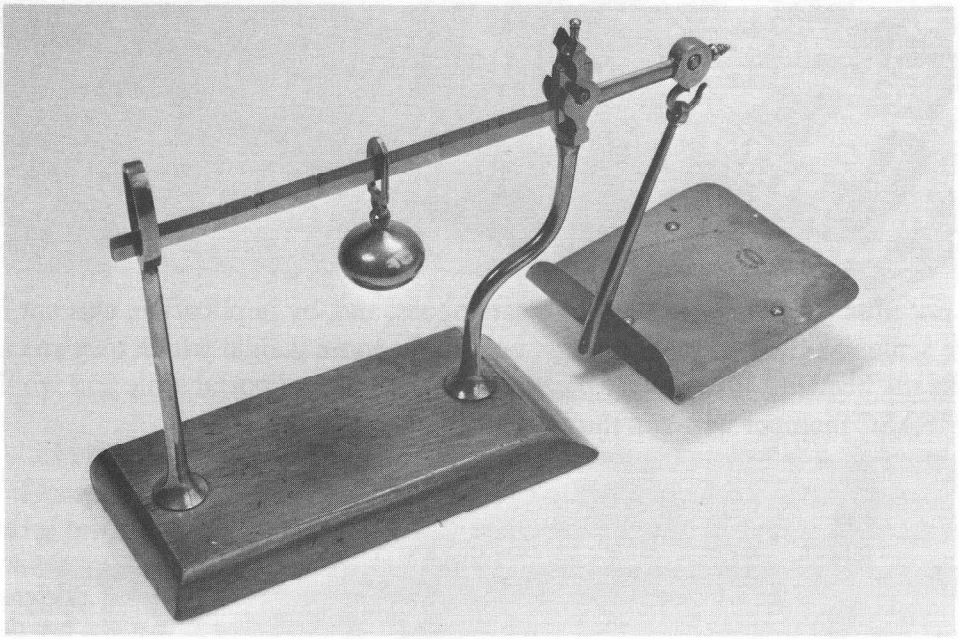


Fig. 7.

By 1906, the same design, 367, was still being produced, but they relabelled it the 367P, (see Fig. 8,) and sold it as a Computing Paper Balance. This balance gave the weight of a *Ream of Paper when one Sheet is placed on the Scale Pan, Brass Scale mounted on Mahogany Slab; dispensing entirely with loose weights. Capacity up to 120 lb. per Ream of 480 sheets. Price 35/–*

But our scales are modified and do **not** ***'dispense entirely with loose weights.'*** Our W & T Avery scales weigh up to 16 oz. using the poise inside the guard loop, but weigh up to 32 oz. by adding the poise outside the guard loop, (see Fig. 9.) The steelyard blade was lengthened to take the extra poise, but everything else was the normal 367 design, with a marble slab. The normal poise

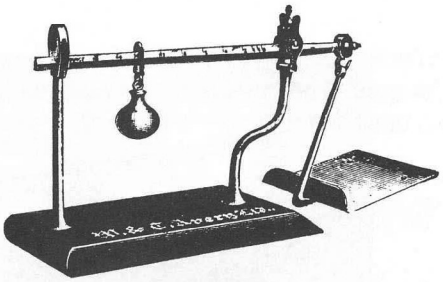


Fig. 8. W & T Avery Ltd. computing Paper Balance, in the 1906 catalogue.

was used as the loose weight, and a slightly smarter design of poise was used for the captive poise, (see Fig. 10.) The postage rates stamped on the blade were those current between 1840 and 1865. We consulted the late Mr. Eric Parrish, our friend and the curator of the Avery Museum, about this curious scale and he said that he had never seen this variation before.

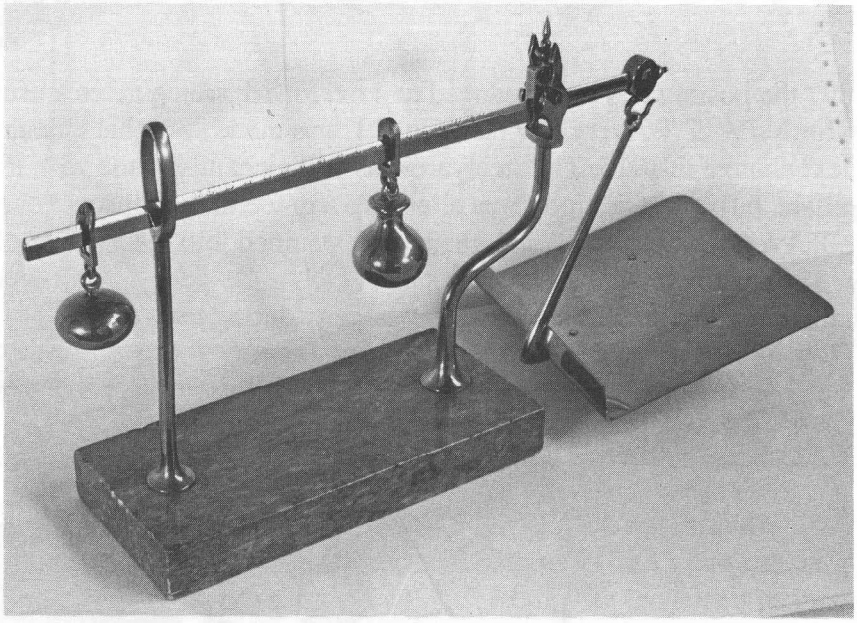


Fig. 9. Our W & T Avery postal steelyard, to weigh 32 oz. Made before 1865.

It was not illustrated in W & T Avery's catalogues, and, by implication, was not the normal way that the scale weighed up to 32 oz, as it needed the loose weight which they so carefully pointed out, was not needed. We are very pleased with our unusual postal scale and would like the help of any ISASC member who can throw more light on this scale.

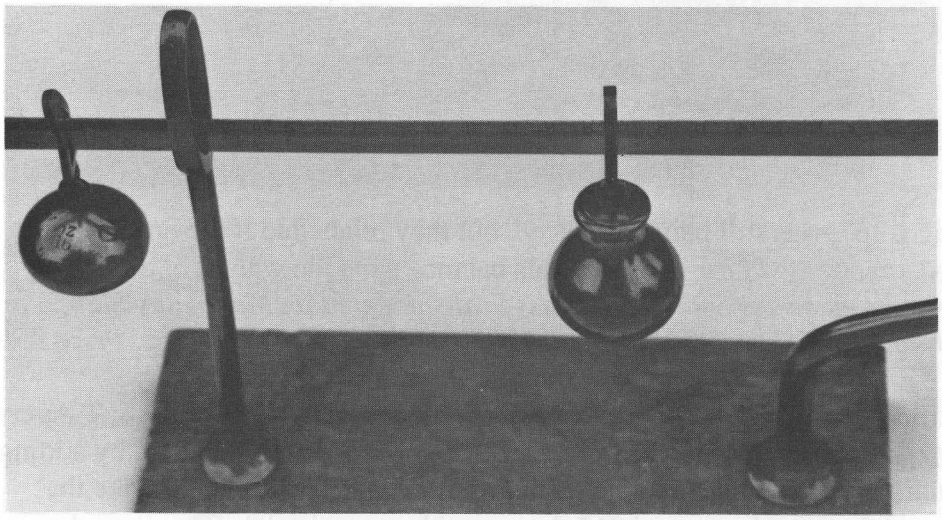


Fig. 10. The poises of our scale, showing the difference between the two designs.

Notes & Queries

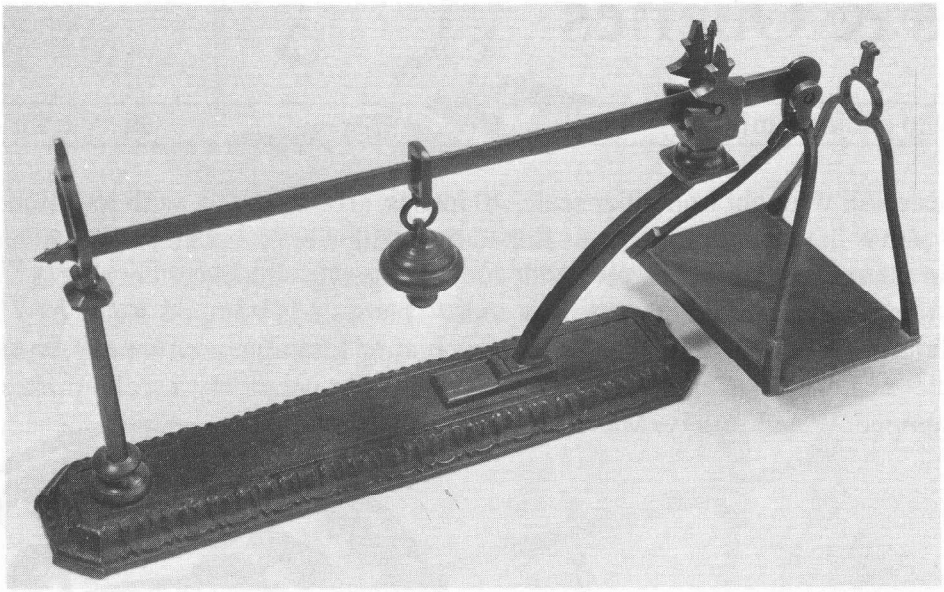
NQ 113 Who made them? Query from D Schoenly

We have a beautiful wrought iron pillar scale, 40 inches, (100 cm,) tall, with four lion feet. The brass weight pan is hanging on three brass linked rods with a brass balance ball between them. The porcelain plate, (Fig. 1,) is on a very wide loop–hanger, giving excellent access to the plate. The brass lattice beam has Sharkey agate box ends. The beam is stamped 'Rep'd by J Newman, Dublin,' and the porcelain plate has a transfer print stating 'Manufactured for J Newman, Dublin Beam & Scale–maker, 156, Capel St.' But if J Newman was genuinely a scale–maker, why is the beam also stamped 'W & T Avery, Maker, Birmingham'?

Reply from the Editor

J Newman was working by about 1840, and his company was bought up by W & T Avery Ltd. in 1914. The only documentary evidence I know is an undated catalogue kept at the Avery Historical Museum, printed about 1900, in which he advertised scales, weighing machines, weigh–bridges, weights, beams, counter–scales, chemists' scales and steelyards, etc. As with many scale companies in Britain in the late 19th century, he both made scales and bought in scales that were more economically made by other companies;– and here we have the evidence for that. It was more efficient for him to buy lattice beam scales from W & T Avery in Birmingham, and ship them over to Ireland, then to have a contract to repair the scales once they were his responsibility.

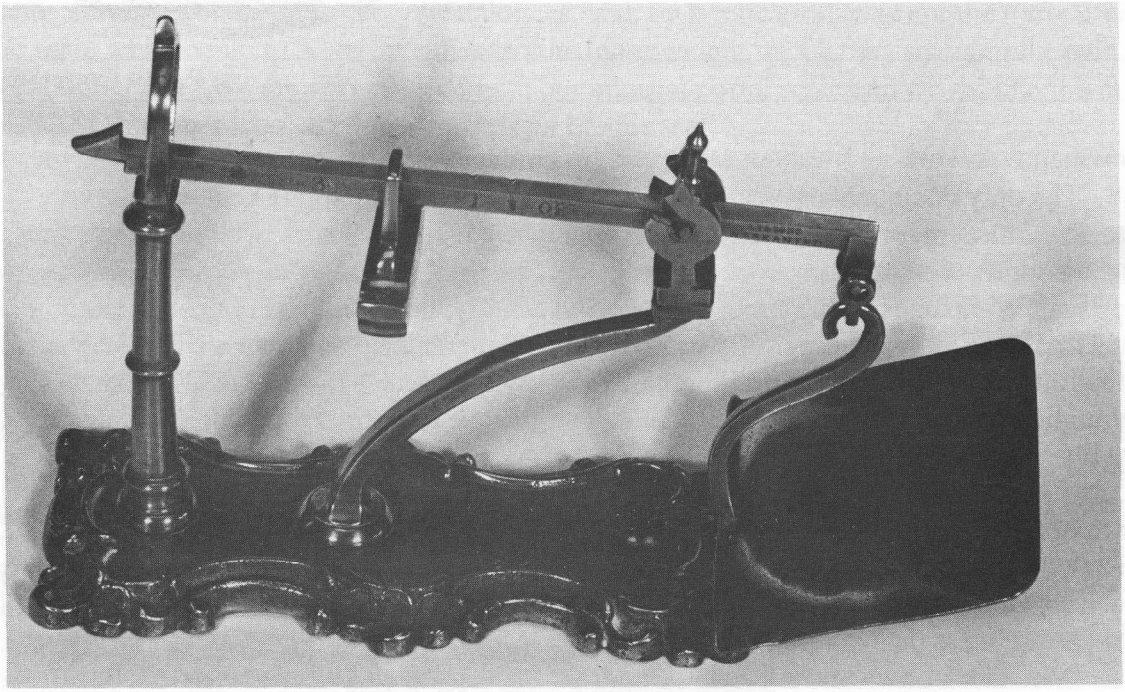
The reason that we know that he was working by 1840, is on the long brass postal steelyard, Fig. 2, which is stamped 'J Newman, Capel St, Dublin' in a circle on the letter plate, stamped 'Newman, Dublin' on the beam, and stamped 'S & P WARRANTED' at the base of the sloping pillar. S & P were the makers, and they changed to 'S, P & SONS' by 1850.



S & P were Simcox & Pemberton, brass founders of Livery St, Birmingham, in trade directories between 1818 and 1842. They made these handsome steelyards with their own name or initials only, and they also made them wholesale for others to retail.

This scale has a pretty cast-iron base, which is appropriately heavy for a 12 inch, (30 cm,) long steelyard.

A much smaller version was made by 'S, P & SONS WARRANTED', Fig. 3. Was it one of the letter scales that they exhibited at the Great Exhibition in 1851? Most of the products exhibited there were grossly over-ornamented, to show off the skills and the 'artistry' of the manufacturers, but some makers *were* restrained! Alternatively, perhaps the version that they exhibited was the



one with the steelyard weight shaped like a clenched fist, like the one kept by the Weights and Measures Department, (Trading Standards,) in Bedford.

The close–up of the name, (Fig. 4) reveals the lack of bushes, (little steel rings round the pivot point,) on the loop supporting the letter hanger. This suggests that the company was not concerned with precision or with long–lasting bearings.

Both postal steelyards look as if they were made in direct competition with the Avery postal steelyard and the Day and Millward steelyard shown in the previous article, (EQM pages 1514–1518.)

With thanks to Dick Schoenly and Lou uit den Boogaard for the illustrations.

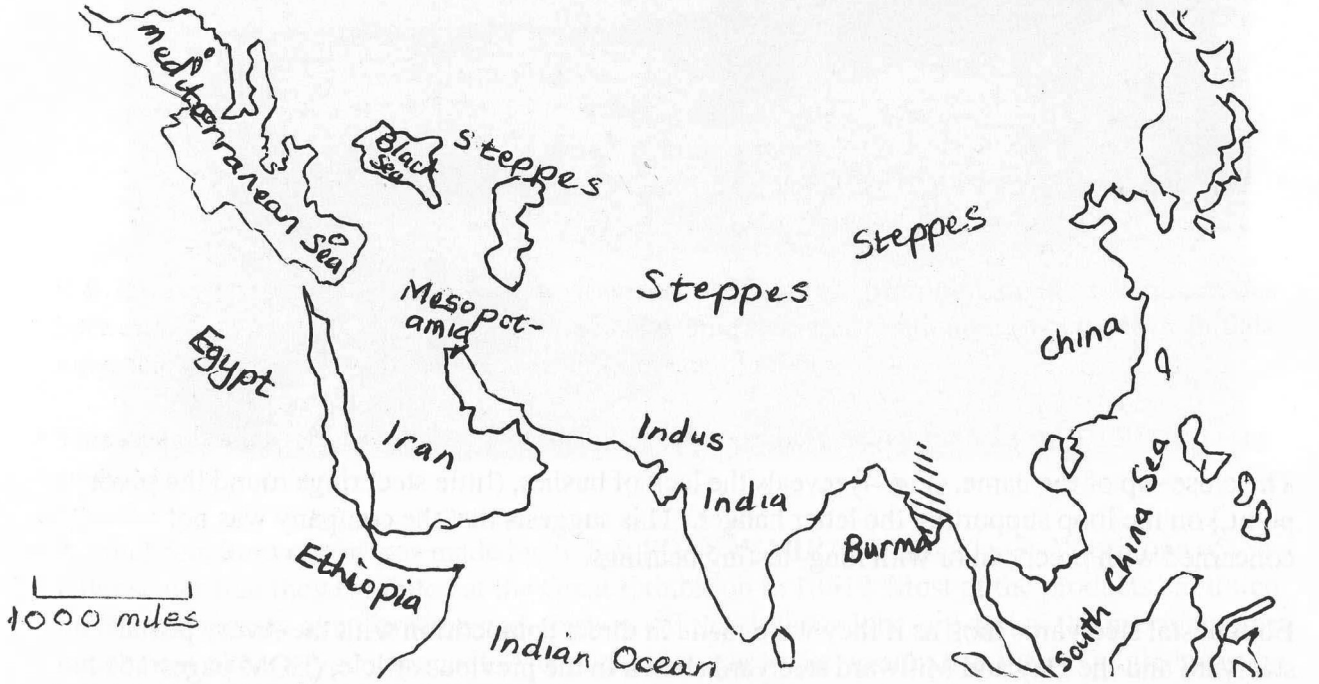
How I got started

By Joan & Donald Gear

The weights of the Golden Land

Burma has had many names;–the golden Chersonese of Ptolemy[1] and Milton[2], Myanma, the land of a million pagodas where Kipling's[3] 'neater, sweeter maiden dwells in her cleaner, greener land', a land of romance and beauty. It was isolated from Western culture, and the Buddhist people of Burma had no effective coinage from the end of the first millenium AD until after 1865 but preferred to weigh silver bullion and other currency ingots with weights shaped as a feline or an anserine[4] bird. It is a land with historical accounts which go back almost as far as Britain's do. It has historical links with eastern India and western China and prehistorical links with the Steppe nomads[5]. (See Fig 1). Partly because of these links and partly because of Buddhist concern with

animal life, the Burmese, perhaps the most devout of Buddhists, made considerable use of other forms of symbolism than written words. It was one of those symbols which started my wife and me on the study of Burmese weights in 1958, and then, later, of other oriental weights. Over thirty years these studies have given us hundreds of hours of pleasure. The weights formed a focal point from which to commence the study of the origins of the mass units, the multiples of the mass, the art motifs, their shamanistic[6], Buddhist and political symbolism and their trans-Asian transfer. These studies necessitated going back in time to the Indus valley civilisations[7] of 2,000 BC, to the Chinese Shang[8] civilisation and its bronzes of the same period, to the somewhat later animal-style art of the Steppe nomads and to the development of Burmese art and history.



In 1958 a German friend visited us in Rangoon. He was formerly a Captain of one of those U-boats which shadowed the invasion fleet in which I travelled to North Africa in 1942. We had met in the Sudan. To entertain him I took him to see the great golden Shwe Dagon Pagoda, (Fig. 2) one of the most spectacular of all pagodas. On our way out of the pagoda precinct, we went down the long, covered flight of steps leading to the street from the main platform. Both sides of the steps, then as now, were lined with stalls selling most things which Rangoon residents might require. A few of the stalls which sold hardware also sold some of the ancient Burmese weights. At one of these stalls, my friend's attention was attracted by the unusual beast and bird shapes of the weights, an attraction which was lessened by their dark, dirty, greasy surfaces. Studying them closely, he discovered an impressed sign on one of them. ဃ Obviously after one year in Burma, I was expected to be an expert on matters Burmese, so he enquired the meaning of me. Admitting that I did not know, except that it was the Burmese letter 'gha', we asked the stall-holder. He did not know either. My friend left for Germany and I was left with what seemed a silly little problem. Just what did that letter mean? To find the solution to that problem was where our interest in weights began in 1958. We did not find the answer until 1989.

As the months passed, we discovered that there were other signs on the weights and that these were associated with other styles of weights though all were of the basic bird and beast shapes.

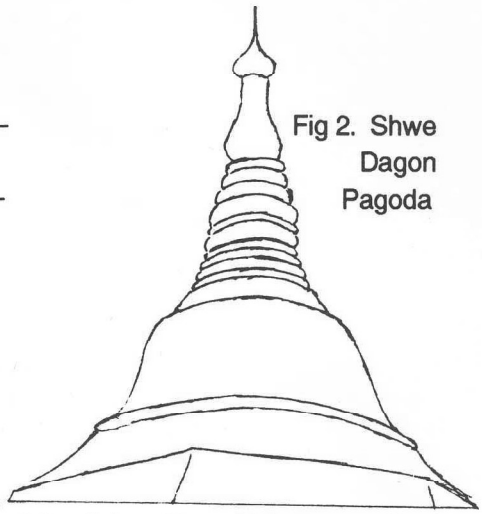


Fig 2. Shwe Dagon Pagoda

We discovered also that though the weights had received passing comments concerning their existence from travellers since the 18th century, this was also almost all the published information that existed, other than a rare general article in the Burmese newspapers. We recall with great pleasure the visits we paid to all kinds of people throughout much of Burma in the search for information. We spoke to village headmen and villagers, university professors and their students in Rangoon and Mandalay, to directors of government departments and their staff, to museum curators and to many people who were anxious to assist including newspaper proprietors in Mandalay, bank managers in Taungdwingyi, and stall-holders in Rangoon, Mandalay, Pegu, Magwe and elsewhere. We visited remote monasteries where knowledgeable monks resided. We sat cross-legged and shoeless below the dais upon which the abbot sat in his burned-orange robes, gently fanning himself with his palm-leaf fan to waft away the flies and mosquitoes. In a Buddhist monastery, from normal courtesy, we could not take any life. So, having no fans, we would endure the bites of the mosquitoes and move our feet to avoid the scuttling cockroaches. Occasionally we treated with the local rebels, where they were friendly, so that we might visit a monk or a man, usually aged, with special knowledge, for discussion, or visit a temple to see its donation cabinet which often contained weights. Sometimes these would be from disintegrating stupas[9] where they had been buried or from family possessions, given in both cases to gain merit. However, there was little useful information to be gained from these visits. Why should there be? Official production had ceased about one hundred years previously. Most Burmese were little different from most Westerners and more interested in the future than the past, just as there are many western school children today who do not know who Stalin and Hitler were.

As much as anything, it was the romance of the search which stimulated the interest in the weights. My normal work took me to outlying regions. My wife and I would travel by Landrover as far as possible, and then continue on foot or by ox-cart, bumping over the ruts and boulders on the forest tracks. In some places there were tree orchids in profusion, and once, on a single tree, we counted almost two hundred golden spray orchids. Sometimes we had to wait for the carts and it is still a delight to recall such a wait watching the arcing tops of the giant bamboos silhouetted against the lightening dawn sky above the mist over a lake and listening to the peaceful tinkle of the bells capping the htis, (spires) of a nearby pagoda. On other occasions, if we should be near a village on a feast day, we would see the girls dressed in their colourful blouses and long skirts, their glossy black hair ornamented with a half-circlet of white scented jasmine, gracefully scattering petals on the path to the pagoda.

As time went by our knowledge of the weights grew and we gained a better idea of what to look for and collect. It was stimulating too when it became clear to us that we had found a field of study which had not been swamped by large numbers of academics, large sums of money and masses of equipment. When a sufficiency of information had been acquired to classify the weights, it then became possible to devise a survey. At this stage we had to leave Burma for another country and the opportunities to continue with the study in the field disappeared. When we had time, later on, to analyse our information, it became clear that our knowledge was insufficient to solve the many problems that had become apparent. Why were the particular mass units and weight sequences employed? Why use scales, weights and bullion in preference to a

coinage? Why use these particular types of material? Why put beast-like and bird-like figures on pedestals of different shapes? What were the models for the animal shapes, since they were not native to Burma? Why did the styles change? What did the whole weights and even their parts signify? Why did only Burma, of all the countries in Eastern Asia, apparently, use animal-shaped weights, except for the elephant weights of north Thailand? Was there a connection between the lion and duck weights of ancient Mesopotamia[10] and those of Burma? And so on.

When we returned to Burma in 1969, we continued with the collection of weights, with the weighings and countings and with the enquiries. When we again left Burma for another country in 1972, it was evident that we had to learn more about other ancient Asian mass systems, of the mythologies and religious systems and their associated symbolisms, of the development of small bronze animal art in Asia of which the Scythians[11] of the first millenium BC were prime exponents. When retirement came we had the time to acquire a modicum of the knowledge that we had learned we should need. It was from this time onwards that our interest in the weights changed from its initial collector's fervour to a means of using them, firstly, to direct our studies into previously unexplored (by us) regions throughout Asia and, secondly, to lead us back in time from the 19th century AD into the mists of pre-history.

At this stage we have reached the end of the beginning of our interest. The lovely days of the field investigations are gone, except in our memories. But the romance of searching the recorded travels of the ancients remains, the hope of finding something new in the next museum in the next country we visit is always there and both continue to stimulate our investigations into the origins of all those various facets of the histories of the oriental weights which still await discovery.

1 Ptolemy, a Roman author and astronomer working in Egypt circa 140 AD.
2 Milton, prolific English poet and author, 1608-1674.
3 Kipling, popular poet and author in England and India, 1865-1936.
4 Anserine, like one of the goose family of birds, specifically a mandarin duck.
5 Steppe nomads, little known bronze-age cultures of numerous tribes living on high grass lands between the Black Sea and China.
6 Shamanistic, religion based on a belief in unseen spirits who can only be influenced by the priests (Shamans).
7 Indus Valley civilisations, a series of city states of great sophistication along the River Indus, in Pakistan.
8 Shang dynasty, Chinese bronze-age culture from 18th to 12th century BC.
9 Stupa, mound or tower serving as a Buddhist shrine.
10 Mesopotamia, stone age agrarian culture with cities, between the Tigris and the Euphrates rivers (now Iraq) from 5000 BC.
11 Scythians, one of the cultures of the Steppes, who produced exceptionally elegant bronze castings of many animals.